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Subterranea

April 2005

Issue 7

In This Issue

Mount Wise
Maritime HQ

Kenton Bar
War Room

Paris Trip 2004

Books, News
and Reviews

The Newsletter of Subterranea Britannica and The Cold War Research Study Group.
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Subterranea Britannica is a society devoted to the study of man-made and man-used, underground structures and the archaeology of the Cold War. The main focus of interest is on abandoned and forgotten structures and, in the case of Cold War structures, studies are entirely confined to declassified and decommissioned structures. The society is open to all and its membership includes all walks of life. Members are invited to contribute to this magazine even if this just means sending very welcome snippets from newspapers and magazines.

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The committee of Subterranea Britannica and the editor do not necessarily agree with any views expressed and cannot check the accuracy of any material sent in.

Cover Photos - Front Cover, Mount Wise-The spine 'corridor' in the Plymouth Underground Extension (tunnel network), Rear Cover, The roof of the MHQ (Top), The radio room on the upper level (Bottom) Photos Nick Catford

News

Cold War archaeology at Spadeadam (Cumbria): identification of unfinished seven-storey Blue Streak missile silo

An article in *British Archaeology* reports the investigation of a Blue Streak missile silo brought to light as a result of tree felling at the Spadeadam Cold War base for testing nuclear missile technology. Blue Streak evolved from proposals made in 1953, and was designed to have a range of 1,500 nautical miles, thus being able to reach 57% of the Soviet population at the time. Over 3,500 hectares of 'virtually uninhabited' moorland at Spadeadam Waste, already under Forestry Commission control, were selected for the building of testing facilities. These included launch-pads on which the missiles' engines and control equipment could be tested, although the rockets were secured to prevent actual takeoff. Five main sites included, *inter alia*, a facility for separating liquid oxygen and nitrogen from air. There being no place in the UK suitable for actual test launches, these were conducted at Woomera in South Australia.

By 1958 the preferred launching option was an underground silo, and work began on a seven-storey silo at Spadeadam. Not shown on any contemporary site diagrams, the location, or even existence, of this silo remained uncertain. However, recent tree-felling has revealed the beginnings of excavations for this structure. In April 1960 the missile project was cancelled, on grounds of cost and lack of flexibility. Blue Streak was adopted for the European Launcher Development Organisation.

The article includes a sketch of a silo design proposed by Francis Walley in 1959. Some 60 launch silos were envisaged for the UK. There is also a photograph of a water-filled hole in a shallow valley interpreted as the preparatory work for the test silo. Treasury documents survive authorising expenditure on this structure, but no technical plans or drawings are known to survive.

Source: Catherine Tuck and Wayne D. Cocroft, 2005, Digging up the Space Age. *British Archaeology* 81, 26 - 31.

Icehouse at Kings Cross (London)

Standing building recording and an archaeological watching brief by A. Telfer and P. Thrale for London

Underground Ltd at the Kings Cross Underground Station Redevelopment Phase II Works (TQ 30194 83068) is reported in *Post-Medieval Archaeology*. Investigation of the site of the new Northern Ticket Hall revealed the remains of a brick-built icehouse, at first thought to pre-date the Great Northern Hotel [opened 1854] and possibly to have been associated with the late 18th century London Smallpox Hospital. Investigation of the icehouse led to the discovery of a curving brick tunnel linking it to the basement kitchen of the Hotel, suggesting use or re-use by the later establishment. Stamped letters on brick samples taken from the icehouse have now been found to suggest an 1860s date. The lowest part of a second icehouse is also reported, pre-dating the 1860s structure (the curved tunnel having been so-shaped to avoid it); this had been truncated by the 1863 Hotel Curve Tunnel, constructed to allow trains to access Faringdon Station. The earlier icehouse was also constructed of 1860s bricks, and it is thought that it was possibly never completed, on account of the railway tunnel construction, and that the more complete icehouse 3m away was built in its stead. The later icehouse and tunnel had been completely backfilled in the second half of the 20th century.

A short site visit is also reported, for recording a post-medieval well or soakaway found during construction of the new Western Ticket Hall.

Source: *Post-Medieval Archaeology* 38(2), 263 - 264 (2004)

Derbyshire and Staffordshire mines investigations

The latest issue of the Peak District Mines Historical Society's *Newsletter* contains a further (13th) batch of notes of archaeological observations, above and or below ground, relating to (1) firesetting at Long Torr Grotto, Matlock Bath, Derbyshire; (2) Goldsitch Moss colliery, Quarnford, Staffordshire; (3) Intake Dale mine, Shuttle Rake, Hazlebadge, Derbyshire; (4) damage to important sites at Old Seedlow mine, Highfields / Bindcliff mines, and Carsington Pasture mines]

Source: HEATHCOTE, Chris, and John BARNATT, 2005, Peak District mines - observations and discoveries - Part 13. *Nl. Peak District Mines Historical Society* 113, 9 - 10.

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News

Goodluck Mine, Via Gellia, Derbyshire

Work is in progress on clearing debris and recording artefacts underground in the Goodluck lead mine at Via Gellia.

Source: SMITH, Paul, and Paul CHANDLER, 2005, Goodluck mine. *Nl. Peak District Mines Historical Society* 113, page 6 [Derbyshire: Via Gellia: clearance of debris / recording of artefacts]

Nineteenth-century drainage system and tunnel at Barr Loch, Lochwinnock, Renfrewshire

Investigations have been reported of a drainage system at NS 3576 5817 to NS 3738 5958, including a tunnel, made in 1814 to drain Barr Loch to provide agricultural land, and to bypass Castle Semple Loch. The area was flooded again in 1946. From NS 3738 5958 to NS 3897 6017 the stone-lined tunnel about 1.2 m diameter with an arched entrance runs north-eastwards, and passes below Risk Burn at NS 3805 5997. Partial collapse is indicated by several fenced-off holes. Stone-capped entry shafts are noted at places along the alignment.

Source: S. Nisbet, Lochwinnock, Barr Loch, *Post-Medieval Archaeology* 38(2), page 382 (2004)

Gilmerton Cove, rock-cut 'caves' South of Edinburgh

Archaeological investigations in the rock-cut 'caves' at Gilmerton, at NT 2925 6865 are reported. The site is being developed as a visitor attraction, and comprises a number of linked underground chambers cut into sandstone. An entrance from Drum Street leads to a main passage off which are a number of irregularly shaped rooms, some with rock-cut benches and tables. Some chambers have been blocked. Newly discovered features reported include a set of steps to a former rear entrance, a well or cistern, a network of drainage channels, a tunnel containing a drain, and incised graffiti. Reported finds include predominantly 19th and 20th century ceramics, glass, metal objects, and bone, with some 18th century material. Historical sources indicate that the site was used as a drinking den and popular local attraction.

Source: *Post-Medieval Archaeology* 38(2), page 358 (2004)

Waggonway tunnel of 1784 near Swansea, Wales

A waggonway tunnel dating from 1784 has been recorded below the Swansea Vale Railway in South Wales.

Source: M. Lawler, 2004, Swansea: Townshend's great leat and waggonway (SS 675980) *Post-Medieval Archaeology* 38(2), page 400.

Craiglea slate quarry tunnels, Perthshire

John Crae, Jim Salvona, Peter Ireson and Ivan Young, of the Grampian Speleological Group, have investigated two tunnels, apparently driven to allow access and drainage, at the Craiglea slate quarry in Perthshire. The tunnels are reported to be of the order of two metres high and wide, the longer lower one estimated at 180 metres long, with 150 metres or so accessible before floodwater is encountered to a depth of about a metre. The quarry is said to have been abandoned in the early 1900s. A full report is expected to appear in the *GSG Bulletin*.

Source: Anon, 2004, Perthshire. *Nl Grampian Speleological Group* 121, page 8.

Coal mine at Gullane, East Lothian

Renewed but ultimately abandoned attempts to re-enter an old coal mine near the shore at Gullane have been reported. It appears that undermining the golf course seemed inadvisable.

Source: Anon, 2004, East Lothian. *Nl Grampian Speleological Group* 121, page 8.

Tyndrum lead mines (Perthshire)

The small village of Tyndrum is most familiar to many as having a station on the Glasgow to Fort William and Mallaig railway line. A mountainside to the west of the village has abundant surface traces of lead and zinc mining activity dating from 1741 to 1862, with access underground to sections of levels and worked out stopes on a number of levels. Ivan Young has collected together field observations above and below ground, and related them to published sources to present a comprehensive account of the site. His report includes a location map, a sketch plan and section of the vein and workings, photographs of surface and subterranean views, a details of relevant publications.

Source: Ivan Young, 2004, Tyndrum lead mines. *Bull. Grampian Speleological Group*, 4th Series, 2(1), 13 - 20

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Mine and countermines tunnels at St. Andrews Castle, Scotland

The Fortress Study Group's annual conference, based at Edinburgh September 3rd - 6th 2004, included a visit to what is left (the landward side) of the Castle at St. Andrews. A report of the visit includes a photograph taken inside an impressive mine or countermine tunnel descending below the castle's defensive ditch. These tunnels saw action during the siege of 1546 - 47.

Source: Charles Blackwood, 2005, FSG Conference Edinburgh September 3 - 6 2004. *Casemate* 72, 9 - 13.

Reigate stone-quarrying history extended back to the Roman occupation

The Doods Way tile kiln

Recent archaeological excavations in Reigate (east Surrey) have revealed a substantially complete second century (Roman) tile kiln on the Gault Clay outcrop at Doods Way on the outskirts of the town. The kiln structure contains four large squared blocks of Reigate stone, a material previously known only from Saxon and later work. The nature of Reigate stone is such that it was almost certainly always extracted from underground quarries, where large sound blocks could be obtained, unaffected by Ice-Age and post-Glacial deep weathering by freeze-thaw action. There is thus now a distinct possibility that amongst the underground quarries (currently all sealed) in the Colley Hill - Reigate Hill - Wray Common area there may be found quarry tunnels made getting on for 2,000 years ago. No underground building-stone quarries have been entered in the area of the old Parish of Reigate in living memory, although some are known to have been worked near Wray Common in the early and middle 19th century, although a hearthstone mine (in the same Upper Greensand formation) was worked at Colley Hill nearby until about 1961.

As the site was in course of re-development, the Doods Way kiln has now been lifted in three parts, and is in storage pending provision of a suitable permanent home.

Roman Reigate stone in Southwark

Roman use of Reigate stone has also now been confirmed as a result of archaeological excavations for a new underground ticket-hall for the Jubilee Line Extension at London Bridge, where two slabs have been found alongside the Roman approach road, now Borough High Street, to the original London Bridge

The Romans invaded Britain in AD 43, and established their capital city at Colchester. A crossing place, later London Bridge, was established on the Thames, and by AD 50 a town, Londinium, had been established. The greater part of this was on the north side of the river, taking advantage of the low hills to stay clear of flooding, and of the Walbrook and other streams for water supply. In AD 60 Boudica, Queen of the Iceni of East Anglia, led her tribe along with the Trinovantes of Essex in a revolt that destroyed the Roman towns at Colchester, London, and St. Albans.

The south bank of the Thames was generally low-lying and marshy, but a low sandy or gravelly island allowed a subsidiary settlement at, approximately, the present site of Borough High Street and London Bridge Station. This too was destroyed in AD 60.

It became possible to organise archaeological excavations here as a result of the construction of the Jubilee Line Extension to Stratford. Amongst the more surprising results of the excavations, in the years 1991 - 98, was the discovery amongst the remains of the building foundations of pre-Boudican Southwark of Reigate stone. These included 'Some fragments of moulded stone from a masonry building' which had been 'used as part of the make-up dumps for this building. Petrological analysis of this stone has shown that it was Reigate / Merstham stone.'

The authors of the excavation report observe that 'There is no local building stone available in Southwark, so all the stone found on the site was brought from quarries outside London. Stone rubble from deposits in periods 1 - 3 included Reigate stone, Kentish ragstone, chalk, flint (possibly knapped) and ferruginous sandstone. The only decorative stone recorded from these early contexts was the Wealden shale.'

These finds are the earliest recorded well stratified occurrences of Reigate stone in London. Although widely found in London in medieval contexts, there has been hardly any Reigate stone - which is quarried close to Reigate and Merstham in Surrey - recorded from Roman contexts in the City. Such early use, or in this instance reuse, of the stone indicates that it was exploited by the Romans for use in London at a much earlier date than was previously supposed.

More Reigate stone, from the 2nd or 3rd century, was also reported from BGH95, Building 30 at the same location. Three flat and worn Reigate stones formed a small level area 1.15m long and 0.4m wide immediately adjacent to the foundation. This feature may have been the fragmentary survival of an

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internal doorway threshold or, alternatively, the surviving element of a stone floor.

Interestingly, Roman brick and tile of 'Reigate' type is also reported from Southwark. Drummond-Murray and Thompson (1998) suggest that the earliest buildings at Southwark, alongside the road (now Borough High Street) toward the Thames river crossing (later London Bridge) were erected in AD 50 - 55, contemporary with the earliest Roman buildings in London itself. They propose that Boudica destroyed not only the main city, but crossed the Thames to destroy the suburb at Southwark as well.

Source: Phil Jones, 2004, A Roman tile kiln discovered in Reigate. *Bull. Surrey Archaeological Society* 378, 1 - 6.

Source: James Drummond-Murray, Peter Thompson, 1998, Did Boudica burn Southwark? The story of the Jubilee Line Extension. *Current Archaeology* 14(2) (158), 48 - 49.

Source: James Drummond-Murray, Peter Thompson, and Carrie Cowan, 2002, *Settlement in Roman Southwark. Archaeological excavations (1991 - 8) for the London Underground Limited Jubilee Line Extension Project*. Museum of London Archaeological Service: *MOLAS Monograph* 12: xiv + 294pp [ISBN 1-901992-28-4]

Sixth known bust of Julius Caesar discovered in rock-cut cistern on Pantelleria island (Italy) - September 2003

A perfectly preserved bust of Julius Gaius Caesar (c. 101 - 44 BC) has been discovered hidden in a rock-cut cistern on the small island Pantelleria, south-west of Sicily. The perfectly preserved bust is the best of the six now known to have survived. Julius Caesar came to power in 60 BC, and was assassinated in 44 BC. He is said to have been revered on Pantelleria (known in classical times as Cossyra), and it is thought that his bust was deliberately hidden in the cistern during the period when Emperor Nero (Nero Claudius Caesar, 37 - 68 AD, Emperor 54 - 68 AD) 'set out to obliterate symbols of the past that threatened to eclipse his own glory.'

Source: *The Times*, 20 September 2003.

Cave mummies of Nepal

High altitude caves in the Himalayas, artificial chambers excavated into conglomerate exposed in cliff faces along the Gandak river valley in the Mustang region of Nepal have proved to be an environment conducive to mummification. One such

cave, recently studied by archaeologists from the Institute of Prehistory at the University at Köln, contained the partially mummified remains of 27 adults and children in coffins, with associated grave goods. Radiocarbon dating indicates these burials to have been between 400 and 100 BC. The cave openings are difficult of access, being some 30 metres up a vertical cliff.

Source: Andrew Chamberlain, 2004, Cave mummies of Nepal. *Speleology* 4, page 5 [Andrew Chamberlain is at the Department of Archaeology, University of Sheffield]

World Heritage nomination for the Cornwall and west Devon mining landscapes

The Department of Culture Media and Sport (DCMS) announced on 24 January 2005 that the Cornwall and west Devon mining landscape has been chosen as the UK's 2005 nomination for World Heritage Site status.

The area supplied much of the western world's copper and tin during the last 4,000 years. For a time during the 18th and 19th centuries it was the world's greatest producer of these metals.

Ten areas have been selected as especially representative of the industry - St. Just; Hayle; Camborne / Redruth; Caradon; Godolphin / Tregonning; Wendron; St. Agnes; St. Day / Gwennap; Luxulyan valley and Charlestown; the Tamar valley; and Tavistock.

The UK's current World Heritage Sites are the Ironbridge Gorge (Shropshire); Stonehenge, Avebury, and associated sites (Wiltshire); Durham Castle and Cathedral; Studley Royal Park and Fountains Abbey; the Castles and town walls of King Edward in Gwynned; Blenheim Palace; the City of Bath; Hadrian's Wall; Westminster Palace, Westminster Abbey, and St. Margaret's Church; the Tower of London; Canterbury Cathedral, St. Augustine's Abbey, and St. Martin's Church; the Old and New Towns of Edinburgh; Maritime Greenwich; the heart of Neolithic Orkney; the historic town of St. George and fortifications (Bermuda); Blaenavon industrial landscape; the Derwent valley mills; Saltaire; New Lanark; Royal Botanic Gardens, Kew; Liverpool maritime mercantile city; the Giant's Causeway; St. Kilda; Henderson Island; Gough and Inaccessible Islands; and the Dorset and east Devon coast.

Source: Anon, 2005, World Heritage nomination for the Cornwall and west Devon mining landscapes. *News. Northern Mine Research Society*, February 2005, 4 - 6.

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New World Heritage Site: Matobo Hills, Zimbabwe

The Matobo Hills in Zimbabwe have been designated a World Heritage Site. The area is of distinctive granite landforms with natural cave shelters, many of which are richly decorated with cave art, considered to be prehistoric and probably of the late Stone Age. Source: Illustrations have been published in *Speleology* [Bull. British Cave Research Association]

Slate quarry museums in Wales

Llechwedd Slate Quarries near Blaenau Ffestiniog in North Wales is amongst the premier tourist attractions in the Principality, and includes an underground train ride. There are now proposals to create a second large slate quarrying museum at the opencast Dinorwic slate quarries at Llenberis, to be served by the Llanberis Steam Railway.

Source: [John] Eric Robinson, 2005, Where is the heart of Wales? *Geology Today*, 21(1), 7 - 8.

European Geoparks in Ireland

The Copper Coast and the Marble Arch Caves (Irish Republic) and Cuilcagh Mountain Geoparks (Northern Ireland) are announced. Geoparks are a sites designated for conservation of the geological heritage, stemming from an idea conceived by two geologists, Guy Martini of France and Nikolas Zouros from Greece. The Copper Coast is on the southern coast of the Republic of Ireland, between Tramore and Stradbally in County Waterford. A mineralised fault and fracture system occurs within sedimentary and igneous rocks, and was mined for copper in the nineteenth century, by principally Cornish and Welsh miners, via adits and shafts. A mine engine house survives, and a mining heritage trail has been laid out at Bunmahon.

The Marble Arch Caves and Cuilcagh Mountain Park is in County Fermanagh, in limestone and sandstone country. The Carboniferous Limestone hosts Northern Ireland's most extensive karst area, including Pollasumera Cave, the Monastir Gorge, and the Marble Arch Caves. The 'Marble Arch' itself is a natural rock bridge, being a surviving fragment of an otherwise collapsed cave roof. There is a visitor centre from which public guided cave tours are made.

Other European Geoparks include the Abberley Hills and Malvern Hills (England); the Réserve Géologique de Haute-Provence and Astrobleme Rochechouart Chassenon (France); Maestrazago Cultural Park and Parque Natural Cabo de Gata-Nijar (Spain); the Petrified Forest on Lesvos and Psiloritis Krete Natural

History Museum (Greece); and the Vulkaneifel and the Naturpark Nordlicher Teutoburger Wald and Wichengebirge Geoparks (Germany.)

Source: Chris Stillman, 2005, Irish additions to the European Geoparks Network. *Geology Today* 21(1), 14 - 15.

Svalbard colliery aerial ropeways protected

Coal of Jurassic, rather than Carboniferous, age is or has been mined in the arctic Spitzbergen (Svalbard) archipelago for about a century, by both Norwegian and Russian interests. A 10km aerial ropeway on timber pylons linked one of the mines, at Longyearbyen, with the stockpile area at the loading quay, where ships were able to take coal away during months when the sea was not frozen-over. The ropeway has now been legally protected by the Norwegian parliament as an important relic of, perhaps, the only major industrial activity on the islands.

Source: Ken Catford, 2002, The industrial archaeology of Spitzbergen. *Industrial Archaeology Review* 24(1), 23 - 36.

Source: Ken Catford, 2004, Svalbard ropeways protected. *Industrial Archaeology News* 131, 12 - 13.

Cave tourism at Poor Knights Islands, New Zealand

Three-hour excursions by the jet boat Cave Rider, departing from Tutukaka (New Zealand North Island), visit Rikoriko Cave, 'the World's largest sea cave,' at the Poor Knights Islands, 23 km off the north-east coast of Northland. This is evidently not for those who like their caves 'pure and simple' as 'the high-speed ocean ride explores the caves, arches, and unique marine and bird life of the islands' and Rikoriko is 'renowned for its acoustics and live concerts, Swiss yodellers, didgeridoo players and Maori haka challenges' whatever they might be!

Source: ANON, 2005, High-speed link to Kiwi caves. *The Guardian Travel*, 8 January 2005, page 5. www.diving.co.nz.

DCMS / EH Heritage Protection Review: changes to the Listing system in April 2005

The Department for Culture, Media and Sport (DCMS) and English Heritage (EH) are currently

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taking forward proposals for the comprehensive reform of the heritage protection system in England and Wales. These reforms are designed to make the heritage protection system simpler, more open and more flexible, while maintaining the current levels of protection.

The main element of these reforms will be the unification of the current systems of Listing and Scheduling and Registering for Historic Sites into a single designation regime. A white paper is to be published during 2005.

More immediate changes, from April 2005, will be:

- Administration of the Listing system will be transferred from DCMS to EH
- New notification arrangements for the owners in Listing cases
- New consultation arrangements for owners and Local Planning Authorities
- Better information for the owners of Listed Buildings
- The introduction of a new formal review process for Listing decisions.

In addition, DCMS will also be publicly consulting on new criteria for Listing which will eventually replace those currently set out in *Planning Policy Guidance* 15.

The DCMS report *Review of Heritage protection: the way forward* is available on the DCMS website <http://www.culture.gov.uk> and the English Heritage website <http://www.english-heritage.org.uk> may also be consulted.

Source: DCMS / English Heritage, 2005, *Listing is changing*. DCMS / EH: 4pp and press release.

Memorial erected at RAF Fauld explosion site

On 27 November 1944 almost 4,000 tonnes of bombs in store in a disused gypsum mine at Fauld, near Hanbury, in Staffordshire, exploded. An entire farm and its occupants disappeared, leaving a five hectare (12 acre) crater still visible today. A reservoir, containing 27 million litres (six million gallons) of water vanished. An estimated 70 persons died. Their names appear on a new memorial erected at the site to commemorate the disaster of 60 years ago. The explosion has been described as the biggest bang of World War II, after the atomic bomb tests in the USA and attacks on Japan.

Source: David Ward, 2004, Village honours victims of 1944 big bang. *The Guardian*, 10 November 2004, page 10.

Underground in Estonia: military bunkers

Four Swedish cavers visited abandoned underground military bunkers and an air traffic control centre in Estonia in the summer of 2003. Their report is in Swedish, but three illustrations shew a vertical iron ladder, a flooded tunnel being negotiated in a rubber boat, and what look like rock-cut tunnel walls and a ceiling with well-developed stalactites.

Source: Hans-Björn Eriksson, Johan Balk, and Peter Pavek, 2004, Under jorden i Estland [Underground in Estonia], *Grottan [en Tidskrift från Sveriges Speleolog]* 39(3), 17 - 21.

Collapse of ground into underground building-stone quarry at St. Pietersberg, Maastricht, The Netherlands

A collapse of ground into old underground building-stone quarries at St. Pietersberg, on the outskirts of Maastricht recently, has severed the underground connection between the St. Pietersberg quarries and Fort St. Pieter which stands on the northern end of the hill. The fall also rendered the old main road from Maastricht to Liege, Luikerweger, impassable, although this has for many years been no more than a minor country road. There is access from within the fort via a rock-cut staircase which winds around the fort's well, to a now isolated section of the quarry below.

Source: Joep Orbons (Maastricht)

More on the chalk mines in and around Reading

Your Chairman's strategically located brother, at Reading, in pursuit of his own strictly surface interests (he is assisting with the revision of one or more volumes in *The Buildings of England* series, and is the author of several books on the local history of Reading) supplies a steady stream of information on the chalk mines in and around Reading.

He reports that *The Berkshire Book* (produced by the Womens' Institute) includes the information that cardboard coffins, for possible victims of gas poisoning in World War II, were stored in the Emmer Green chalk mines in 1939.

The *Reading Mercury* of 4 March 1799 reported that seems to be a chalk mine collapse near Henley in the following terms:

The chalk pit at Marsh Mills, near Henley, having fallen in and made the road entirely impassable, a new road is making through part of the grounds of

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Lord Malmesbury, at Park Place.

There is a Park Place shewn on the OS map at SU 7782.

The *Reading Mercury* of 4 March and 1 April 1793 lists Berkshire brickmakers so may very well be a useful clue to the location of furthermore forgotten chalk mines.

Northern Mine Research Society President Mike Gill to retire

Mike Gill will be stepping down as President of the Northern Mine Research Society this year. Martin Roe has been nominated to succeed him. Mike has a long and distinguished record of published archival research, especially in Yorkshire lead mining. Martin already has to his credit a track record of research into mining archaeology, above and below ground.

Source: *Newsletter Northern Mine Research Society*, February 2005, pages 2 and 4.

Coal and other mines in Afghanistan

Conditions in the Karkar coal mine, one of 11 in Afghanistan, were described in an article in *The Times* by Anthony Loyd in October 2004. Two huge explosions had resulted in the loss of 200 lives. Two men had recently been killed when a mine cage broke loose and hurtled down a shaft inclined at 65°. Miners work at the face with hand tools, with inevitably low productivity. An underground fire was resulting in cases of carbon monoxide poisoning. Despite such discouragements, the Afghanistan Government is anxious to develop its mining industry, exploiting deposits of coal, hydrocarbons, copper, emeralds, and lapis lazuli. British and American geological surveying teams will be working, with World Bank backing, with their Afghan counterparts to assess the economically available resources.

Source: Anthony Loyd, Afghanistan's coal miners toil on in the pits of death. *The Times*, 19 October 2004, page 19.

Last of the Selby Coalfield (Yorkshire) mines closes

The Selby Coalfield, in 1983 when the first mine (Wistow) commenced production, offered coal reserves as extensive in area as the Isle of Wight, with seams up to 10 feet thick. The entire reserve was developed along very modern lines, with five mines all linked underground by a system of conveyor tunnels to a single surface exit at Gascoigne Wood, when the coal was to be taken by

train to nearby power stations. It was said that the scale of the engineering 'made the Channel Tunnel look like a fleabite.' Shafts and inclined entrance roadways at the North Selby, Riccall, Stillingfleet, Whitmoor, and Wistow mines were made through water-bearing ground using the ground freezing technique. Pithead buildings were clad in local stone, to minimise their environmental impact. At peak production, in 1993-94, 3,000 miners turned out 12m tonnes of coal.

After political intervention, mine closures, and privatisation in 1995, when the National Coal Board was succeeded by UK Coal, what had seemed an assured long-term future became increasingly questionable. Both unexpected adverse geological conditions and market prices have been blamed. It is now, astonishingly, cheaper to import coal than to mine our own reserves at home. The Selby mines system, with massive reserves in hand, is not being mothballed, but the shafts and tunnels permanently plugged with steel and concrete. Riccall, the last mine at work, closed on 26 October 2004.

Source: Hilary Macaskill, 2004, Dust to dust. *The Guardian* G2, 26 October 2004, 6 - 7.

Kellingley colliery expansion plans ditched (West Yorkshire)

UK Coal is to ditch expansion plans for the company's second most productive mine, Kellingley, near Pontefract, West Yorkshire, with the unfortunate result of up to 250 redundancies. Kellingley has a workforce of 550 and is one of only three pits left at work in Yorkshire following the closure of Riccall (the last of the Selby pits) in the autumn of 2004.

The company has cited 'geological problems' for a production shortfall at Kellingley, and a consequential failure to be able to supply the quantities of coal required by their contract with Drax Power Station. Draw has warned, in turn, that the cost of finding alternative fuel supplies seems likely to reduce its expected 2005 profits by £ 10m, and a further £ 5 in 2006.

Source: Terry McALISTER and Nigel BURNHAM, 2005, UK Coal ditches expansion plans at Yorkshire pit. *The Guardian*, 12 January 2005, page 16.

Source: Terry McALISTER, 2005, UK Coal cites geology as reason for Drax supply failure. *The Guardian*, 15 February 2005, page 16.

Ellington Colliery (Northumberland) closed

Ellington colliery, near Ashington, Northumberland,

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closed on 26 January 2005. Seams were worked as far as eight miles out under the North Sea. Closure was precipitated by 'unstoppable floodwater' although this was not an inundation from the sea. 340 miners were employed here. The mine served a nearby aluminium smelter.

Source: Peter Hetherington, 2005, Anger as north-east's last pit is shut down. *The Guardian*, 27 January 2005, page 13.

Welbeck Colliery (Nottinghamshire) closure in prospect

The closure of Welbeck Colliery in north Nottinghamshire, with the potential loss of 520 jobs, has been announced. The mine has been in production for 90 years, but diminished reserves and problems with faulting have been blamed for the closure decision. There is a possibility that at least some of the mining workforce may be transferred to Harworth and Thoresby, also in Nottinghamshire.

Source: Terry Macalister, 2005, 520 jobs at risk in Notts pit closure. *The Guardian*, 11 February 2005, page 24.

Roof fall in Level Fawr (Cymystwyth), Mid Wales

A significant fall has been reported from Level Fawr in the Cymystwyth mines in mid-Wales, which is thought to have occurred at the end of May or early June 2004. The collapse is about 100 metres in from the entrance, at the end of an impressively timbered T-junction where a mine truck remains in place on its rails. A passage to the left has been blocked, and some debris has spilled into the main route. Access (with difficulty) to the far side of the fall remains possible by two alternative routes. The mines contains much timbering and stacked deads, and many false floors, so caution is urged.

Source: Kelvin Lake, 2004, Rood collapse in Level Fawr. *Descent* 179, page 29.

Combe Down underground Bath stone quarries

The firm Mouchel Parkman is to advise English Partnerships on best value and best practice in connection with an application to stabilise the underground building-stone quarries below Combe Down, to the south of Bath city centre. Although the presence of the underground quarries at shallow depth was well-known, and indeed the galleries were for many years open to anyone who cared to explore, houses were erected above them, despite there being only, in some places, as little as two metres

between the quarry ceilings and the ground surface. Bath and North East Somerset Council is now applying to English Partnerships for funding to employ engineers and contractors to fill the mines. Mouchel Parkman's principal geo-environmental engineer at their Bristol office is managing the project, estimated to cost £ 130m, of which some £ 100,000 *per annum* in fees will go to Mouchel Parkman, who were awarded the work in 1999 and expect it to run for another five years. The report is accompanied by a small colour photograph taken in one of the underground quarry tunnels.

Source: Anon, 2004, MP to advise on stabilisation of Bath stone mines. *Mprint [Mouchel Parkman Staff Newsletter]*, Autumn 2004, page 3.

35 days alone in the dark in SW France

Jean-Luc Josuat-Vergès has been found alive after surviving for 35 days lost in 'a labyrinth of underground caves' in south-west France. He had wandered into the 'caves' with a bottle of whisky on 18 December after telling his wife he 'wanted to be alone.' The 'caves' are described as 'a network of galleries and grottos' at Madiran in the Hautes-Pyrénées, once used as a mushroom farm.

The man survived, he said, by eating clay and rotted timber. He was discovered some 200 metres in from the entrance as a result of school-children, out of school as a result of a teachers' strike, noticing his car parked nearby.

Source: Kim Willsher, Man survives five weeks underground. *The Guardian*, 24 January 2005, page 11

The New York Subway - 1904 to 2004

The centenary of the first nine mile ride of what was to become New York's 722-mile Subway system was celebrated on 27 October 2004. The first train in 1904 departed from the then brand new City Hall Station for 145th Street with Mayor George McClellan at the controls. It left half an hour later than scheduled, the excuse for this particular train delay being the unusual one that the ceremonial speeches over-ran their allotted time! 150,000 people paid a nickel each to ride the trains on their first day. The Subway was in part modelled on London's (and the world's first) Underground, which had been developing since 1863. Chief architect of the first Subway, William Barclay Parsons, had worked on building the Panama Canal, and visited London to see our own underground trains before designing his own system for the USA.

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The network now has 468 stations serving 4.5 million passengers a day. Half a million of these pass Times Square.

Source: James Bone, 2004, New York celebrates 100 years of its underground movement. *The Times*, 27 October 2004, page 17.

New York Subway services on Lines A and C disrupted by flaming shopping trolley

Lines A and C on the New York Subway suffered greater damage and services disruption in January 2005 than was caused by the destruction of the World Trade Center which stood above one of the stations. Services on Line C could be suspended for up to five years. It appears that the damage was done, to equipment in a signalling control room, by vagrants abandoning a shopping trolley full of burning timber, which they had been using as a brasier to keep themselves warm. The room contained 600 electrical devices and a great deal of crucial signalling circuitry. Lines A and C carried, until the disaster, 580,000 passengers each day, so over half a million people daily now have to find alternative routes.

Source: YOUNGE, Gary, 2005, Trolley fire halts New York trains. *The Guardian*, 26 January 2005, page 16.

Intercontinental Hotel at Berchtesgaden, Obersalzberg.

The Berchtesgaden Intercontinental Hotel is in course of erection on 'Goering's Hill' at Obersalzberg, near the Austrian - German border, on the site of Adolf Hitler's mountain retreat, where he and Joseph Goebbels, Hermann Goering, Rudolf Hess, and others, relaxed enjoying spectacular views, and directed World War II. The second volume of *Mein Kampf* was dictated here. Martin Bormann bought up farms and chalets on the mountain for Hitler, and about 6,000 labourers constructed villas, a greenhouse complex to supply fresh vegetables, barracks, an airstrip, and underground bunkers. American bombing in 1945 destroyed most of this, apart from the Platterhof (a hotel for Hitler's guests), the Eagle's Nest tea-house, and the bunkers. The Platterhof was subsequently demolished. The Intercontinental is being built on the site of Goering's villa.

The 135-room hotel is due to open in March 2005.

Source: Roger Boyes, 2004, Hitler's Alpine hideaway reborn as spa for rich. *The Times*, 25 October 2004, page 15.

Underground tourism at Machynlleth, Powys

'King Arthur's Labyrinth,' a subterranean tourist trip, is described as 'an underground network of tunnels and caverns in which Welsh legends of King Arthur are retold using narrative, music, light, and tableaux.' School groups enter on a boat sailing along an 'underground river.' If you feel tempted to pay for an hour or so underground with music and lighting effects and stories, not to mention boat-loads of children, it seems you can find out more at www.kingarthurslabyrinth.com

Source: *Education Guardian*, 14 September 2004, page 13.

A bunker art museum in Taiwan

A colour photograph taken inside the 'Bunker Art Museum' in Taiwan was published in *The Guardian* in September 2004, with a brief caption describes the establishment as housing 18 works of art to promote peace, housed in 'a derelict bunker' or 'abandoned bomb shelters.' The photograph shows a spacious rock-cut gallery about 4.5 metres high and six metres wide.

Source: Anon, 2004, Picturing peace: art fills disused bomb shelters. *The Guardian*, 14 September 2004, page 15.

Donbass Symphony Orchestra debut in Soledar salt mine, Ukraine

The Guardian of 5 October 2004 published a photograph of the Donbass Symphony Orchestra assembled for a public performance 200 metres below ground, in a salt mine cavern 120 metres long and 30 metres high. The mine, at Soledar, is 60 miles north of the industrial city Donetsk. The audience of 200, lowered 22 at a time via the mine shaft, wore hard hats and protective clothing, rather than evening dress.

Source: Nick Paton Walsh, 2004, Underground music: orchestra's salt mine debut. *The Guardian*, 5 October 2004, page 13.

Jeanie Barrie's Cave, near Carlops, Peeblesshire

Field observations above and below ground are reported and interpreted in the light of historical evidence related to an enigmatic cave at NT 153554 near Carlops in the Pentland Hills. The cave is formed in a soft red sandstone conglomerate with a calcite matrix, and consists of a constricted wet

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passage about 100 meters long. If natural, it is geologically unusual if not unique, as not formed in limestone. There is a possibility that it may have been dug in connection with local mining activities. The report is accompanied by surface and subterranean photographs, a plan and section, and a list of references to all traced relevant publications.

Source: Alan L. Jeffreys, 2004, Jeanie Barrie's Cave, Peeblesshire - an overview. *Bull. Grampian Speleological Group*, 4th Series, 2(1), 36 - 43 [The Grampian Speleological Group's website is at <http://www.sat.dundee.ec.uk/~arb/gsg/>]

Ice Age cave art museum planned for Creswell Crags, Nottinghamshire

A museum and education centre are planned at the Creswell Crags limestone gorge and caves, near Worksop, with £ 4.26m lottery funding. The caves in limestone are thought to have been the northernmost limit of explorations by Ice Age man, and two years ago were reported to contain Britain's earliest cave art which had not previously been recognised. The 13,000 year old depictions of birds, bison, deer and bears, and 'dancing girls and female sexual parts', were created not by straightforward drawings, but by modifications to the natural rock surfaces - by the additions of an eye or an ear for example. Examples of the art can be seen at www.creswell-crags.org.uk.

The site is a Scheduled Ancient Monument, and a

Site of Special Scientific Interest, and also part of a Grade II Listed Park.

Source: Helen CARTER, 2005, Heritage preserved: lottery millions for cave art museum. *The Guardian*, 10 January 2005, page 8.

Source: Anon, 2005, Heritage Lottery Fund to safeguard future of Creswell Crags. Geological Curators' Group: *Coprolite* 46, 7 - 8.

News from the Peak District Mining Museum, Matlock Bath, Derbyshire

A new geological display has been completed at the Peak District Mining Museum at Matlock Bath, Derbyshire, which in 2004 celebrated its 25th anniversary. During the year the Museum hosted the launch of a Peak District National Park Authority publication on the *Lead legacy: the prospects for the Peak District's lead mining heritage*, produced in partnership with English Heritage and English Nature.

The Peak District Mining Museum is at The Pavilion, South Parade, MATLOCK BATH, Derbyshire DE4 3NR. Internet links: www.pdmhs.com/ / www.peakmines.co.uk

Source: BAND, Stuart, 2005, News from the Peak District Mining Museum. *Nl. Peak District Mines Historical Society* 113, page 10

Books

News from Croatia

Paul W. SOWAN

Our Croatian colleagues have just sent the latest issue of their splendidly produced journal *Speleolog*, which celebrates its 50th year of publication (1953 - 2003). The Caving Section of the Croatian Mountaineering Club concerns itself primarily with natural caves, but the journal also usually contains a number of papers on natural caves once inhabited by man, and a variety of mines and tunnels including military bunkers. Although the text is in Croatian, there is usually a short English summary, as well as plans, sections, and photographs. In this latest issue our good friend Vlado Božić provides a detailed analysis of the contents of all issues of *Speleolog* from 1953 to 2003. Vlado has also contributed an article on Opatja špilja, or the Abbot Cave, on the island of Brač, with evidence relating to its being inhabited in the 4th / 5th and 16th / 17th centuries. Mea

Bombardelli describes 19th - century French lead-and silver mining at Medvednica. Stašo Forenbacher's paper deals with the prehistoric archaeology of the Jujnovića Cave.

Our Croatian colleagues hosted a most interesting and enjoyable Conference at Starigrad on the Adriatic coast (near Zadar) during the course of which we visited, amongst other sites, a Roman-period water-tunnel, a modern road tunnel in course of construction (we were allowed to drive through between blasts!) and President Tito's Cold War bunker.

Sources: Mladen Kuhta, Pola stoljeća časopisa "Speleolog", *Speleolog* 50/51 (2002 - 2003), 5 - 6; Vlado Božić, Bibliografija časopisa "Speleolog", *Speleolog* 50/51 (2002 - 2003), 7 - 12; Vlado Božić, Opatja špilja, *Speleolog* 50/51 (2002 - 2003), 66 - 70; Mea Bombardelli, Francuski rudnici na Medvednici, *Speleolog* 50/51 (2002 - 2003), 73 - 78; and Stašo

Books

Forenbacher, Jujnovića špilja (Kozica, Biokovo) i njezini pretpovijesni posjetitelji, *Speleolog* 50/51 (2002 - 2003), 79 - 83 [The three articles on caves cited here have short English summaries, and are illustrated with location maps / plans / section / photographs]

Tunnel-master and arsonist of the Great War: the Norton-Griffiths story

Tony Bridgland and Anne Morgan, 2003, *Tunnel-master and arsonist of the Great War: the Norton-Griffiths story*. Barnsley: Leo Cooper / Pen & Sword Books: ix + 242pp [ISBN 0-85052-995-6] £ 19.95.

Sir John Norton-Griffiths [1871 - 1930], made a baronet in 1922, known in his time as Empire Jack, established Griffiths & Company, public works contractors, and was Member of Parliament (Conservative) for first Wednesbury (1910 - 18) and then Wandsworth Central (1918 - 1924.)

Without formal study or qualifications of any kind, and very much a right-wing capitalist and entrepreneur, he graduated from a false start in an army career, through sheep-farming and gold prospecting and service in the Boer Wars, to railway and public works building in southern Africa, North and South America, Canada, and elsewhere. He was found drowned with a bullet wound through his head in the sea off Alexandria in 1930 when financial ruin looked all too likely. Suicide was suspected but not proven.

His main interest to members of Subterranea Britannica revolves around his activities in World War I, during which he was heavily involved with military tunnelling under the front line in Belgium and France. That part of his career has already been explored in print in one of the four chapters in *The master builders. Thomas Brassey, Sir John Aird, Lord Cowdray, Sir John Norton-Griffiths*, by Robert Keith Middlemas (Hutchinson, 1963, 328pp), and more particularly in *War under-ground: the tunnellers of the Great War*, by Alexander Barrie (1962, reprinted 2000 by Spellmount Ltd, 272pp, ISBN 1-86227-081-3]

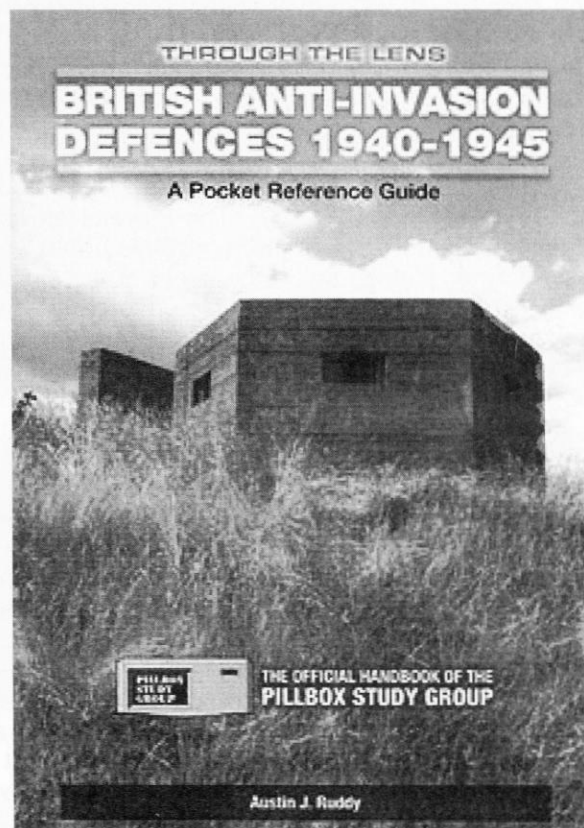
His other claim to fame in World War I was his sabotage of an important oilfield and its installations in Rumania to deny these to the advancing Germans, this episode explaining the 'arsonist' in the book's title.

The present volume deals at length with the character and mode of operation of Norton-Griffiths as a businessman and an unconventional element in the first World War. It contains little, and little new, about underground warfare, and less about mining as such.

British Anti-Invasion Defences 1940-1945 A Pocket Reference Guide

by Austin J Ruddy
published by Historic Military Press 2003

ISBN 1-901313-20-4
34pp, £3-49 + 77p P&P



With the start of the German Blitzkrieg advances in early 1940 it became apparent to the British authorities that a German invasion of Britain was becoming more than just a mere possibility. The construction of a network of anti-invasion defences which ran the length of Britain was hastily begun. Sited around the coast, alongside rivers and canals, roads and railways these structures commonly called 'pillboxes' soon became a common site throughout the country.

Sixty years on and despite the effects of development, erosion and even ignorance and vandalism many of these structures still survive today. This book is intended to provide a brief and concise insight into the history of the pillbox and other Home Front defences, their designs and reasons for their existence. Full of useful information the book will be of interest to both military enthusiasts and local historians as well as curious members of the general public.

Books

There is also a section on airfield defence which describes the 11008/41 Battle HQ listing 4 surviving examples at Binbrook ; TF184 955 , Catfoss ; TA134 477 , Little Staughton ; TL107 621 , and Market Harborough ; SP717 896 and the refurbished example at Wellesbourne Mountford , SP265 545 . Two pillbox types associated with the RAF are also detailed , the FC Construction 'Mushroom' pillbox and the Pickett-Hamilton Fort . The former were given the RAF Type No. 303/41 and are often referred to as the 'Oakington' pillbox as there are 7 examples around that particular airfield . The nickname derives from their circular construction with a domed roof giving 360 degree firing cover . Other examples are listed at Honington ; TL899 762 , Kingscliffe ; TL020 978 , North Weald ; TL487 037 and Peterhead ; NK079 476 . The Pickett-Hamilton Fort is often referred to as the *retractable pillbox* and was designed to 'pop up' in the event of the airfield being invaded . The Fort could hold up to 4 men and were installed on airfields in groups of 3 from January 1941 but by late 1942 were deemed to be useless and so after 335 had been built production stopped . Examples listed are at Horsham St Faith ; TG214 136 , Middle Wallop ; SU300 382 , Silloth ; NY112 536 and Stapleford Tawney ; TQ493 969 . Removed and restored examples can be seen at Tangmere and Thorpe Abbots museums . Two less well known airfield defence pillboxes are also mentioned and both are classed as turrets as they rotate through 360 degrees . The Tett Turret was a concrete turret which sat on top of a 4ft diameter concrete pipe and held two men . A flaw in its design was that it was open topped and prone to flooding ! Examples are listed at Hornchurch ; TQ535 842 2off and Akeman Street ; SP330 139 again 2 off . The latter less well known location was a small grass RLG near Witney in Oxfordshire . The Alan-Williams Turret was a two man steel dome intended for anti-aircraft use but its field of fire from its front sliding door made it useless . Imagine too , the noise inside one when firing a Bren or Lewis gun ! Four in-situ examples are listed including Spitalgate ; SK944 354 and a museum example at Duxford .

There are still many local examples of anti-invasion defences in the south Durham , Teesside and North Yorkshire areas and many of these were brought back to life when Stuart MacMillan came along to a recent club meeting and illustrated the work done during the Defence Of Britain Project when many of these objects were catalogued for an Imperial War Museum database . Some of the best examples can be seen at Greatham Beck near Hartlepool and at Leven near Thornaby . The beck bridge is overlooked by 3 pillboxes and there are 18 5ft square anti-tank concrete blocks on the south side of the beck . During the war this was the only road not only into the village but into Hartlepool as well and with

Greatham aerodrome only half a mile away the importance of defending the bridge from attack becomes apparent . Above Leven Bridge , next to the now derelict Cross Keys public house , there are 2 pillboxes which would have had uninterrupted views south to Yarm and beyond . At the top of Leven Bank there is another pillbox under a tree , tucked into the hedgerow of the Hilton road , there is a Type 27 pillbox in the field behind Leven Cottages and yet another pillbox in Thornaby Woods . All five formed part of the airfield defence for Thornaby aerodrome with the Type 27 having an open centre in which was mounted a light anti-aircraft gun . Of all the pillboxes around Thornaby the most interesting is a two storey example at Stainsby Grange Farm and visible , whilst driving carefully , from the A19 . The book ends by listing other types of defence works including anti-tank walls at Love Lane in Whitby and anti-glider posts . The latter could be seen in great numbers along the Seal Sands road a few years ago but they all appear to have been removed . Technically they have but they have actually been laid down in piles in the fields along the roadside as the land at the time was owned by ICI and the poor state of the concrete poles created a safety hazard . The only remaining in-situ example that I know of is near the football pitches in Rievaulx Avenue , Billingham .

A few years ago I was lucky enough to be involved in a DoBP survey of the wartime bomb dump area of Teesside Airport where we found 3 in-situ Pickett-Hamilton Fort pillboxes and on a recent visit to Marne Barracks , formerly RAF Catterick , I found 2 Type 22 pillboxes which had been given scheduled monument status by English Heritage . A full report on this visit will appear in a future club newsletter and perhaps also a presentation . *This should guarantee the editor using this review !*

This A5 sized paperback is packed full of colour photographs and together with some contemporary black and white photographs , line drawings and a comparison of pillbox cross sections is a useful addition to the bookshelf of any enthusiast with an interest in airfield or military archaeology . It represents good value for money and at such a bargain price you can always buy 2 copies , one for home and one for the car glove compartment . Recommended for anoraks everywhere !

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West Sussex, RH20 4EF

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Freephone ; 0800 0717419
Website ; www.historicmilitarypress.com

DET 31-12-04

Tunnel Rats – a call to arms

A little while back, Sub Brit did some preparatory work with a member to help create a tunnels database as a civil counterpart to Nick Catford's amazingly complete survey of the military remnants of the Royal Observer Corps.

It's really quite hard to find a site type populous enough to merit this rather exhaustive (and exhausting) treatment but, thanks to Dr Beeching's axe-frenzy in the mid-sixties, there are an awful lot of disused rail tunnels scattered around the place.

Unfortunately, this germinal project went awry when the lead researcher decided that, rather than creating an open source historical record on our website, he'd far rather flog the products of his labours to the interested few. His choice I guess.

Sub Brit members Martin Malins and John Smiles have just resurrected the idea of the tunnel database following a few trips to the disused tunnels of Sussex to use the open portals for practising the cave climbing Single Rope Technique.

So far, John and Martin have visited, photographed and researched just five local tunnels.

in Kent and Sussex and have plans to complete this corner of the country and a patch of the East Midlands in early 2005. With about 500 disused tunnels in the UK (that's over 100 miles of underground passages), this leaves just 99% of the task to complete!

The scale of the task is the point of this article, we are looking for volunteers to help cover the rest of the country, especially in tunnel hotspots like Wales, Lancashire and Staffordshire.



John dangles in the mouth of Lywood Tunnel in Sussex; the inspiration behind the Tunnels Database.

To see the sort of detail we are trying to present on each site, take a look at the new entries on Grove Tunnel, Lywood Tunnel and Horsmonden Tunnel on the Sub Brit website

To take part you just need a pair of walking boots, a lamp, an OS map and a camera – we can provide grid references and basic information on everything in your area.

This might be an ideal role for the newly formed regional groups, alongside their existing and growing visit schedules.

If anyone wants to have a go just drop John a line at smileysquad@btinternet.com or call 07970 811121 for more details.

We are also on the lookout for any photographs of now disused tunnels while they were in use, if you have any that we can use, please let us know.

John Smiles

The Dee Tunnel



What, you may ask, is the Dee Tunnel ?

My article goes back quite a long way, to when I bought my current house, and was told that I would not be able to build on the side – ‘because of the water pipes’. I always did wonder what the extensive piece of grass was at the side of the plot, and it was quite nice as well, now I know why.

Investigations followed, and it transpired that it was the aqueduct from the Alwen reservoir in North Wales, to Birkenhead. I knew the Alwen reservoir, I knew the aqueduct alongside the house, I had seen various ‘pipes’ around the Dee Marsh, and I had seen the very large covered reservoir at Thingwall, just outside Birkenhead.

More recently, I was on the Hawarden Railway bridge talking to a Fireman, who had recently been on a ‘shout’ to the Dee Tunnel, apparently some work was taking place in it, and contact was lost with the workers in the Dee Tunnel, so the emergency services were called, and the story had a happy ending.

As an irrelevant aside, Hawarden railway bridge carries the Wrexham / Bidston line across the River Dee, a tunnel was considered. Adjacent to it is the Summers steelwork offices, which is a nice looking building, modelled on the Manchester Midland Hotel, apparently Mr. Summers was a friend of the architect. The Summers steelworks was the result of Mr. Summers moving his iron business from Stockport to cheap land near Shotton. It is now part of Corus.

The various pieces started to fit together, then some time later I picked up a booklet at a visitor centre with the rather grand title of “Inauguration of the Alwen Water Supply to Birkenhead”. This is a facsimile reproduction of a 1921 booklet published by Birkenhead Corporation in 1921, and reproduced by ‘Clwyd Centre for Educational Technology’ in 1978.

Dam, Tunnels, Structures and Reservoirs

Construction of the Alwen Reservoir and Dam was started in 1911 by Birkenhead Corporation. The actual dam is a 400 foot long, 100 foot high masonry / concrete curved structure. The reservoir was filled by around 1917.

Referring to details from the booklet, the aqueduct is 42 miles long, and consists of various diameters of cast iron pipes, up to 36 inches. There are four tunnels along the route:

- 175 yard tunnel near the dam
- 350 yard tunnel near the foot of Moel Fammau – near to the Mold – Ruthin road.
- 250 Yard tunnel under the River Dee
- 175 yard tunnel near Birkenhead called the ‘Mere Hall’ tunnel.

There are also holding tanks at Clawdd Newydd and Mount Pleasant.

Just outside Birkenhead is ‘Cross Hill Reservoir’, which is a massive earth covered 4 acre structure with 217 thirty foot concrete domes, held up by 432 concrete pillars. The structure is 32 feet deep. It is almost wholly above ground level.

The Dee Tunnel

Located near Connahs Quay, this is the major tunnel on the pipeline, and carries the pipeline beneath the River Dee, into Cheshire. At each side of the river, there is a vertical shaft, topped with a circular structure. These used to be freestanding on the river banks, but have now been surrounded by a spear top fence and topped with some ugly vent apparatus. The one on the Cheshire side is in the steelworks but is adjacent to the riverside public footpath.

The vertical shafts are constructed of cast iron segments and are 55 feet deep. The tunnel is 250 yards long, and is also lined with cast iron segments, with a diameter of 8 feet, the crown is a minimum of 13 feet below the river bed. It was constructed using compressed air conditions, presumably because of the location beneath a river.

Contractors

The Dam and Alwen reservoir was contracted to Sir Robert McAlpine. John Cochrane & Sons Ltd built the pipeline and Dee Tunnel.

Pritchard

The Subterranea Britannica Paris tour



The Subterranea Britannica Paris tour by Eurostar, RER and the Metro - 29 - 31 May 2004

Subterranea Britannica has for the last five years or so enjoyed excursions to nearby parts of mainland Europe, most ably organised and led by members Linda Bartlett and Martin Dixon. Hitherto, these weekend or long weekend visits have been by hired coach, taken from Ashford and through the Channel Tunnel by the shuttle train.

Most have been to France, although in 2003 we enjoyed a programme of underground sites in Belgium and The Netherlands. The 2004 excursion was to Paris, travelling there and back by Eurostar from Waterloo, and using the Paris Metro and RER services to travel between sites. Indeed, the Metro stations and tunnels themselves constituted one of the main objects of the excursion.

It was good to be able, this time, to start from Waterloo, instead of Ashford. With only one advertised early morning train from London scheduled to reach Ashford by the required time, and the ever-present risk of 'engineering works' disrupting the railway timetable, those of us who go by train generally travel to Ashford the day before and put up at a Bed & Breakfast.

Saturday 29 May 2004 - London Waterloo Station to Paris Nord by Eurostar

We took the 09.09 train to Paris, stopping only at Ashford *en route*. Most of us had travelled on Eurostar before, to Brussels and / or to Paris, although the newly opened high speed line through Kent, including the long North Downs tunnel, was new to many. From Paris Nord we took Metro line 5 to Bréguet Sabin station, and left luggage at the Hotel Ibis Bastille-Opera. Then, wasting no time, we were back on the Metro, heading south on line 5 to Place d'Italie, changing there for line 6 to Denfert Rochereau, the station nearest to the Catacombes.

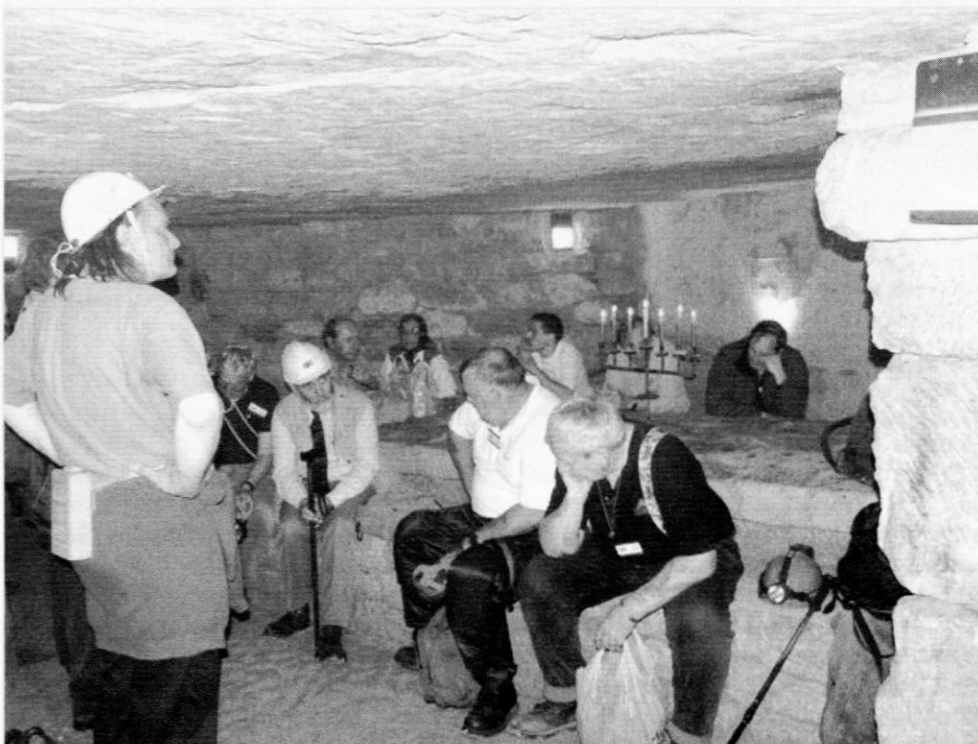
This set the pace for the weekend. Our very energetic and enthusiastic guide announced which line we were to take next, in which direction, and where to change. Nobody got lost! As a railway official, he seemed to have keys to every mysterious door on the system, and the authority to ask train drivers to slow down to let us have a good look at especially interesting features of the tunnels, and to take us around bits of line such as reversing loops not usually traversed by the travelling public. He also

The Subterranea Britannica Paris tour

waved us pass all manner of doors marked *Acces Interdit!*

Les Catacombes

I have visited the catacombes a number of times, the first being in 1956 when a schoolboy. They have not changed. But this time they seemed, curiously, to be more extensive and impressive than before. The entrance is below a small green-painted iron building at 1 Place Denfert-Rochereau. The place is, of course, part of an underground building limestone quarry, used for the disposal of bones from cemeteries cleared some centuries ago to allow the expansion of the city. The place is not at all like the catacombes of Kiev or Rome where the dead were



buried in specially cut chambers or loculi. Although the most visible human remains feature neatly, even artistically arranged thigh-bones and skulls, there has been no attempt to keep all the bone of any one individual together. Behind the neat facades the remains have just been thrown in haphazardly. Should these skeletons' souls ever come to re-inhabit their earthly bodies, there will be no end of confusion sorting out whose bones are whose!

You follow a prescribed winding route passing the stacked bones of some thousands or millions of long-dead Parisiens, inscribed stones, and monuments. There are also some built consolidation works, and a good example of a *fontis*, or bell-shaped roof-fall cavity, in which the stratification of the

superincumbent beds can be seen clearly.

On emerging from the catacombes at 36 Rue Rémy Dumoncel it was a pleasant surprise and extraordinary coincidence to meet David Havlicek from Prague. I had last seen him when, with Ton Breuls of Maastricht, we had visited Ukraine in 1996.

Musee des Carrieres, Hôpital Cochin (Quarries under the Cochin Hospital)

The Hospital is at 27 rue du Faubourg Saint Jacques, and is an ordinary medical hospital occupying several buildings. A basement entrance near the southern end of the building devoted to urological problems leads to a small area of underground quarry which is

in the care of a voluntary organisation, *Societe d'Etudes & d'Amenagement des Anciennes Carrieres des "Capucins" (SEADACC)*, a body which seems to have evolved from the earlier *Société d'Études Historiques des Anciennes Carrières (SEHDACS)*. This organisation and its underground museum is advertised in a useful little guide-book *Paris secret*. The museum is not open to the general public, but guided group visits can be arranged on application.

The network of tunnels is large and complex enough to be fun to explore - you are allowed to potter about as you

choose - but small and compact enough to lead you back to the starting point before too long. The SEADACC members have gone to great trouble to re-create authentic quarrying scenes, and to display features of quarrying styles. There is also a display of quarry tools, and a small exhibition gallery with less robust items on show in glass cases. This is an altogether splendid venture that deserves to be better-known.

Sunday 30 May 2004 - Underground quarries at Ivry-sur-Seine

Having on Saturday visited a quarry re-used as a charnel house, and another preserved just as a quarry, this day we saw two further underground

The Subterranea Britannica Paris tour

quarries, at Ivry-sur-Seine, which had seen other secondary uses. Neither of these is open to the public other than by special arrangement. The first contained some huge deep cylindrical storage silos which had been excavated into the quarry floor as places to store grain. The proprietor had sought to hoard grain here when it was cheap to buy, and sell at a profit in leaner times, but his schemes were thwarted by the authorities, and the complete complement of silos never completed or filled. However, it is recorded that he was able to demonstrate that the grain could be kept in good condition for a considerable time in one of his silos. During World War II the occupying German forces used this quarry as a fuel store, and it was perhaps the Germans who filled up the silos with waste rock or concrete. Volunteers in recent years have hauled all this stuff out again, allowing visitors to peer into the metres-deep silos and contemplate the thought of accidentally tumbling in to what would serve well as a perfect oubliette!

A little way off, up the hill, the second quarry was of immense interest, being a double-decker, worked with galleries on two levels with a couple of metres or so of stone between them. One large part had served as a World War II air-raid shelter, the entrance being via a flight of steps of sufficiently generous proportions to allow a great many people to go underground as quickly as possible. But the more interesting feature of this quarry was the use of a large part of it, on both levels, as the basement of a very large brewery (now demolished) which once stood above it. Apart from the shafts and stairwells, blocked from above by demolition rubble, this contains more or less complete fixtures and fittings, including some quite enormous beer tanks (empty), and various pieces of machinery. An eminently explorable and fascinating place, although not for the unwary, as there are unguarded holes in the floor vertical drops in various places. We could happily have spent some hours here!

Visite des Égouts de Paris

The entrance to this underground display, which is accommodated in tunnels forming an operational part of the Parisian sewerage system, is at the south end of the Pont d'Alma. This is a tourist attraction, open to the public more or less all day, every day, but well done and well worth seeing. There is a ticket kiosk at the head of the stairs down, followed by a designated route through a small network of tunnels containing a well-presented series of displays of illustrations and text (in French and English) explaining the history and development of the Paris sewers. The displays include items of equipment, and explain the working of the systems right up to modern times. It is possible to look along operational tunnels, and to look down into channels of running water, although all the walkways are high and dry. The running water



(probably over 98% pure water even before purification) is a murky brownish-green colour, with occasional leaves floating about. As at Beddington sewage works, the smell (far from overpowering) is more dead leaves and drains than anything. Surprisingly, unlike the sewage works at Beddington (south London), floating condoms were conspicuous by their absence! (Teachers taking school visits to Beddington have to be prepared to field the 'what are those things, Sir?' questions from their pupils!)

The entire display is very well presented, and informative and fascinating. Immediately before the exit stairs back up to the street there is a well-stocked shop selling postcards, souvenirs (including large furry rats), and a good range of books on

The Subterranea Britannica Paris tour

underground Paris. In fact, a very handy place to buy 'our' sorts of guide-books, which might otherwise not be easy to find.

Tour of the Metro

The final visit of the day was to a number of operational and disused stations and associated tunnels on the Metro and RER railways, led by Julian Pepinster who, as a member of staff responsible for the security of the system, was in possession of all the keys to all the doors. Despite changing trains and lines at numerous places, nobody got lost.

We became expert at spotting the 'link' lines and tunnel junctions whereby trains not in service can be

this point, Linda was probably wondering to what extent our third party insurance cover might be valid in the event of an unfortunate accident!

Dinner at Chez Robert

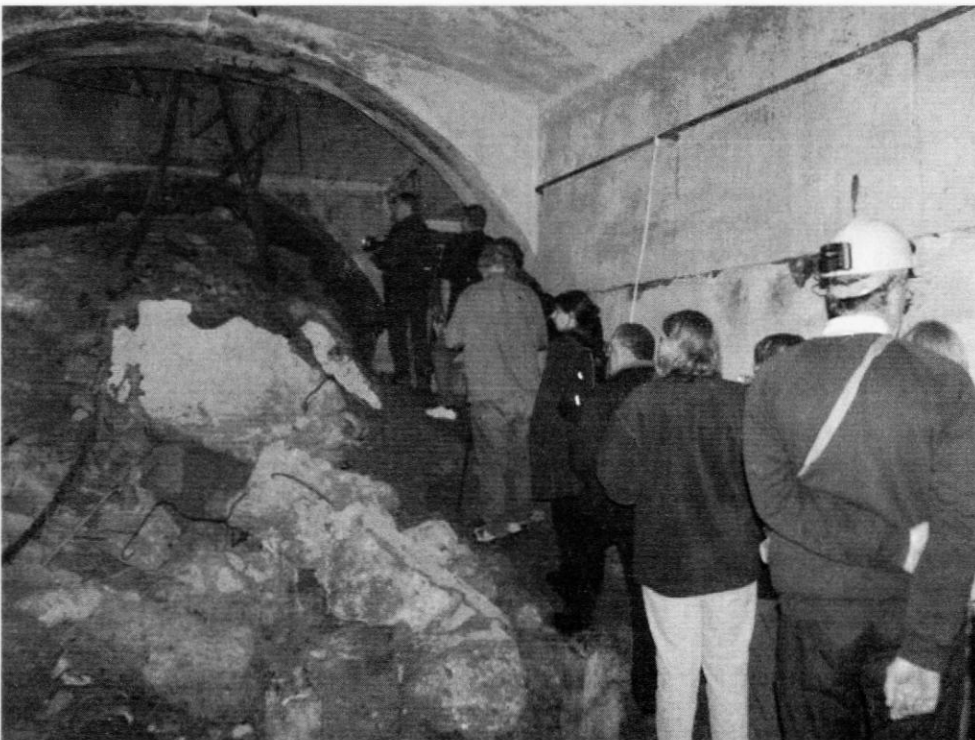
As usual, we had booked an evening meal in as 'underground' a location as feasible, in this case the cellar dining room at Chez Robert. Here, communications appear to have fallen apart, as on arrival we found the tables had all been laid out upstairs! We re-located, and enjoyed, as and when various courses ultimately arrived (some members helped out as waiters to speed things up) an extended and jolly evening.

Monday 31 May 2004 - Canal trip on the Canal St. Martin

The morning after the night before was spent not getting up terribly early, and not walking very far, and taking a canal boat through the huge tunnels of the Canal St. Martin and up an impressive flight of locks to the large Bassin de la Villette. Very agreeable views of tree-lined boulevards, some interesting industrial buildings, and Parisiens going about their affairs on either hand.

Afternoon options

For the afternoon, the party divided. One faction went to see an old church, the remains of which are now underground in a crypt. Your chairman decided to complete his collection of Paris main-line termini by exploring Gare d'Austerlitz and its surroundings (and bar!) The station's name commemorates the Battle of Austerlitz, when on 12 December 1805 Napoleon decisively defeated the combined armies of Austria under Francis II and Russia under Alexander I. Austerlitz is a small formerly Austrian town, now called Slavkov, about 12 miles east of Brno in the Czech Republic. He also went to explore the Natural History Museum's Mineralogy building - not a patch on Brussels or London's equivalent, as for five Euros all you see is one gallery of 'big crystals' and one gallery of 'small crystals' - exquisitely beautiful crystals, no doubt, and all carefully labelled with their chemical formulae and



moved from one line to another. We were taken around a reversing loop at one of the outer termini, the driver being agreeable, and walked around another (not electrified or in service) which is now used as a demonstration workshop for persons being trained in track-laying and maintenance. One very large but hardly if ever used station (St. Martin I think) contains an impressive array of period advertising, having been used as a demonstration site for possible customers contemplating buying advertising space. At another disused station we were able to board a well-preserved vintage metro train of about 1916, kept here as a museum piece and perhaps a film or television location. One of the more hair-raising sites visited was a former underground power station, now full of high-tension electrical gear, with a remarkably close view of some 750 volt bus-bars! At

The Subterranea Britannica Paris tour

places or origin. But there is no attempt at interpretation.

Eurostar back to Waterloo

All, however or wherever they had spent the afternoon, arrived back at Gare du Nord in good time for the train back to Waterloo. It was wonderful, this year, *not* to waste time trailing around a hypermarket on the way home! And not to miss a 'shuttle' as a result of a customs search of a coach! And not to worry about making a connection with a train home from Ashford!

Some recommended reading for Paris

ANGELESGUE, Martine,
Sylvie AUBENAS,
Armelle BERNARD-
SYLVESTRE, Alain
CHAZETTE, Alain
CLÉMENT, Gérard
DIÉTRICH-
SAINSAULIEU, Jean-
Pierre DUBREUIL,
Sylvie GENTY, Michel
HAMEROUX, Catherine
IANCO, Josette
JACQUIN-PHILIPPE,
Dominique LAUJIN,
Guilhen LESAFFRE,
Jean-Jacques
MEYFREDI, Mme.
PENNEC, Marie de
THÉZY, Jean
TRICOIRE, Marc VIRÉ,
and Jean-Pierre
WILLESME, 2002, *Paris
secret*. Paris: Guides
Gallimard: 260 + (4)pp
[ISBN 2-7424-0338-8]
[PWS]



BARROIS, Maurice, 1964, *Le Paris sous Paris*. Geneva: Hachette: 96pp [PWS]

CLÉMENT, Alain, and Gilles THOMAS, 2001, *Atlas du Paris souterrain: la doublure sombre de la ville lumière*. Paris: Éditions Parigramme: 200pp [ISBN 2-84096-191-1][PWS]

GARBUTT, Paul, 1997, *World metro systems*. 2nd edn. Capital Transport Publishing: 136pp [ISBN 1-85414-191-0][PWS]

GÉRARDS, Émile, 1991, *Paris souterrain*. Torcy: DMI Edition: (2) + (2) + (2) + 667pp + plates [Reprint of the original edition of 1908][ISBN 2-84022-002-4] [PWS]

HARDY, Brian, 1999, *Paris Metro handbook*. 3rd edn. Harrow Weald: Capital Transport Publishing: 128pp [ISBN 1-85414-212-7]

HOWSON, F Henry, 1964, *World's underground railways*. London: Ian Allan: 128pp [Paris is in pages 23 - 28]

PATTON, Brian, 2001, *Paris RER handbook*. Harrow Weald: Capital Transport Publishing: 136pp [ISBN 1-85414-230-5]

SALETTA, Patrick, 1990, *A la découverte des souterrains de Paris*. Antony: SIDES335pp [ISBN 2-868610-75-7][PWS]

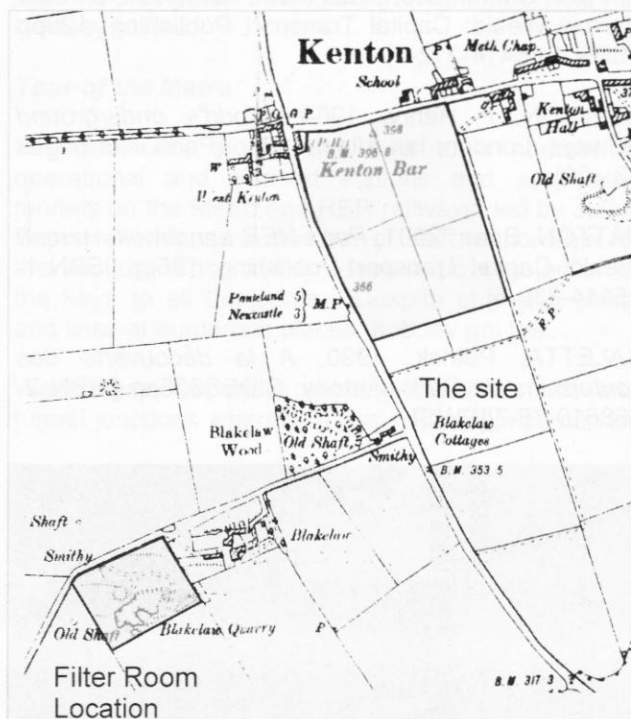
SUTTEL, René, 1986, *Catacombes et carrières de Paris: promenade sous la Capitale*. Paris: Société d'Études Historiques des Anciennes Carrières et Cavités Souterraines: 222 + (2) pp [ISBN 2-9501258-0-8][PWS]

[UK] NAVAL INTELLIGENCE DIVISION, 1942, *France. Volume I. Physical geography*. [UK] Naval Intelligence Division. B.R. 503 (Restricted) Geographical Handbook Series: xii + 279pp + folded map [The Paris Basin is described in pages 21 - 46] [PWS]

Paul W. SOWAN

Kenton Bar

13 Group Fighter Command Headquarters (Kenton Bar) and Region 1 Regional War Room



Kenton Bar Location Plan

During the expansion of the RAF during the late 1930s, the command structure of the air defences of Britain was reviewed. New developments in radar technology and the capabilities of the new Spitfire and Hurricane fighter aircraft, together with the changing nature of the threat posed by the modern bomber aircraft used by the Luftwaffe meant that a comprehensive reorganisation was required. In a command network known as the Dowding System, Fighter Command was divided into four operational Groups, under the control of a central Headquarters at Bentley Priory. Each Group had its own geographical area of responsibility: 10 Group, South West England and South Wales; 11 Group, Southern England; 12 Group, the Midlands; and 13 Group, Britain north of the Humber.

The location of the 13 Group HQ was chosen before the 27th September 1938. Initially there was a temporary above ground operations room brought into use by 24th July 1939 to coincide with the formation of the Group. At this time a permanent underground operations room was under construction, this was completed and was being fitted out by 3rd December 1939 becoming fully operational at 23.59 hours on the night of the 13th of March 1940.

The area controlled by 13 Group was relatively calm during the Battle of Britain, with the brunt of the German assault being borne by 11 and 12 Groups. After the end of the daylight phase of the Battle of Britain, the operational requirements of the air

defence system were changed. On the 1st August 1940 Dyce and Wick sectors were transferred from 13 to 14 Group, a new formation covering the air defence of Scotland with a fifth protected Group Headquarters provided at Inverness. On 9th August 1940 13 Group was further reduced in size with the formation of 9 Group at Barton Hall, Preston (later RAF Longley Lane). This was to concentrate the defences of Manchester, Liverpool, Birmingham and the Western Approaches.

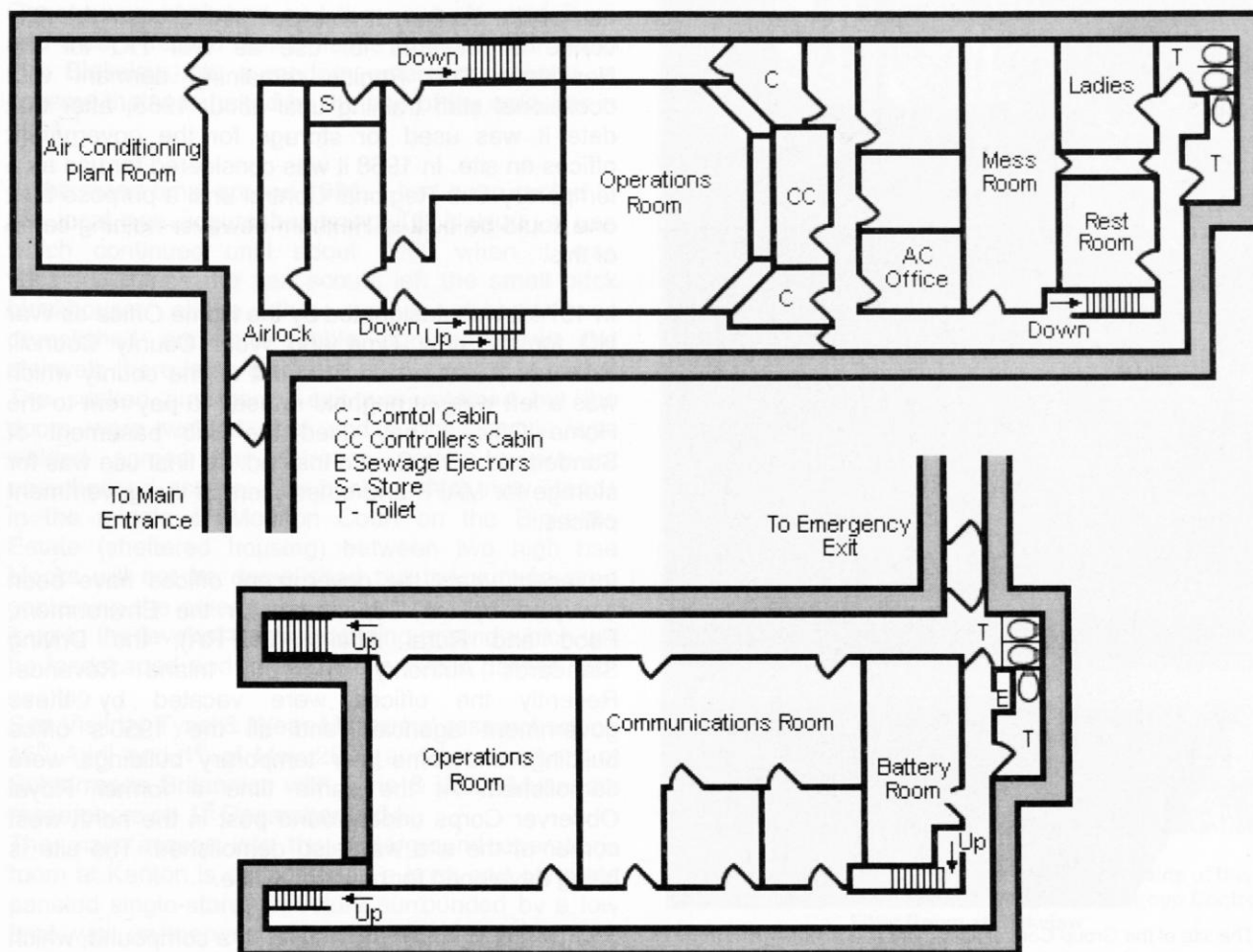
In another development following the Battle of Britain, it was recognised that the central command structure was in danger of being overloaded with information from the various radar stations and observation. To overcome this potential problem, each Group Headquarters were provided with a Filter Room. The purpose of this facility was to receive all reports of aircraft locations, to assimilate and assess this information in order to provide the most accurate possible picture to the Operations Room. The Filter Room for Kenton Bar was built on a separate site, in Blakelaw Quarry. This facility was somewhat smaller than the Group Headquarters, but built to a similar pattern. Each Group was also provided with third smaller communications bunker; the location of the Communications bunker for Kenton Bar is not known. Throughout late 1940 and 1941, the nature of the threat changed again; the Luftwaffe stepped up its night operations against large cities and industrial targets. Through 1941, the majority of German operations seem to be attacks en route to and from Glasgow and Edinburgh and in many ways, the north-East appears to have escaped the worst of the night bombing.

The Operations Record Books from this period are a useful reminder that the role of the headquarters went beyond directing air defence operations. Documents bound in with the operational diaries include combat reports and the development of new tactics, particularly during the switch to night-bombing in late 1940 to 1941.

By 1943, the air defence requirements had changed again, with the increase in offensive actions against occupied Europe and the reduction of massed bombing raids on Britain. 13 Group was amalgamated with 14 Group on the 15th July 1943 and the Group Control was renamed RAF Blakelaw becoming a Sector Operations Room for Catterick and Ouston Sectors in 12 Group.

This change in role meant that the Filter Room apparently became redundant and was taken over by the Military Police in June 1944. The exact role of the Blakelaw bunker at this time is in some doubt; there were proposals to establish a joint USAAF/RAF command centre or even to convert the site into a Maintenance Unit but neither of these appear to have come to anything. In September of that year, the

Kenton Bar



Kenton Bar Site Plan - drawn by Nick Catford

Filter Room was turned over to 321 Squadron, attached to 22 Group.

VJ Day (12th August 1945) marked the end of RAF Blakelaw as an active station. The Royal Observer Corps were stood down, and round the clock manning of the Operations Room was left to a skeleton crew.

The Kenton Bar site was placed on the surplus list in 1947 and the land surrounding the operations room was used for offices by the Ministry of Agriculture with a number of single storey brick buildings being constructed for the purpose. Many of the above ground buildings associated with the Group Headquarters were demolished at this time.

The sites of the two bunkers were subject to intense attention from competing interests. The emergence of the military threat posed by the Soviet Union and its Eastern European satellite states in the late 1940s led to the realisation that the civil defence infrastructure which had been so quickly run down after the end of the war was necessary again. The Civil Defence Act of 1948 and later regulations made under that act, required local governments to make provision for an infrastructure capable of carrying out

the functions of the wartime ARP units; at the time, any future war with the Soviet Union was expected to be very similar to the previous war with Germany, though the additional damage caused by atomic bombing was seen as a major new threat.

In 1950 the Kenton Operations Room was proposed as a Sector Operations Centre for the Northern Sector in the Rotor scheme but discarded in favour of purpose built one near York (This was later built at Shipton but at this time only the area of York had been decided). At the same time the former Group Headquarters bunker at Langley Lane Preston (RAF Longley Lane) was refurbished as a Rotor Sector Operations Centre. The Kenton Bar bunker was selected for reuse as the Regional War Room for Region 1

Kenton Bar was unique amongst Regional War Rooms of this period in that it occupied an earlier structure, rather than a purpose-built facility: it seems likely that the existence of two suitable structures with existing secure communications links was too good an opportunity to miss.

In plan, the purpose-built regional war rooms were very similar to the fighter command Operations Room

Kenton Bar



The site of the Group Control filter room at Blakelaw seen from the roof of an adjacent block of flats.

bunker, being focused on a central two level map room with observation galleries. The life-span of the original Regional War Rooms appears to have been quite short, though details are sketchy. By the time that most of the purpose-built structures were nearing completion in 1955-6, the advent of nuclear weapons had led to an enormous change in the perception of the threat posed by the Soviet Union, and the needs of Civil Defence. The threat now was of complete breakdown of central government with the Regional War Rooms being superseded by Regional Seats of Government, fully autonomous regional command centres, hardened against nuclear attack. Some of the purpose built Regional War Rooms were adapted as Regional Seats of Government, but this was not the case with Kenton Bar which did not have the room for expansion required for the increased number of staff.

The exact date of closure of the regional war room is uncertain although it is thought that most of these facilities had been supplanted by Regional Seats of Government by around 1960.

After its use as war room ceased it was used as a training centre for RSG and later Sub Regional Control staff in Region 1. The presence of materials related to Exercise ARCADE confirms the continued

use of the bunker. It was deemed to be near the City centre target area for use as War HQ for the Newcastle Sub Region remaining dormant with occasional staff training until about 1965, after that date it was used for storage for the government offices on site. In 1968 it was considered for use as a temporary Sub Regional Control until a purpose built one could be built in Hexham however nothing came of this.

In 1974 it was designated by the Home Office as War HQ for the new Tyne and Wear County Council. However it was never fitted out as the county which was a left wing stronghold refused to pay rent to the Home Office. They used the sub basement of Sunderland Civic Centre instead. Its final use was for storage for MAFF and other users of the government offices.

In recent years the government offices have been occupied by the Department for the Environment, Food and Rural Affairs (DEFRA), the Driving Standards Authority and the Inland Revenue. Recently the offices were vacated by these government agencies and all the 1950's office buildings and some later 'temporary' buildings, were demolished. At the same time a former Royal Observer Corps underground post in the north west corner of the site was also demolished. The site is being developed for residential use.

The plan is to retain the bunker in a compound, which will form a park for residents of new development; the two bunker entrances will be in secure compounds. There are no funds available to restore bunker, but limited visits will be arranged from time to time. The original plan was for a northern branch of the Imperial War Museum, but the council zoned the area as residential and there was no provision for parking etc which stopped the plan being implemented. It has been suggested that a trust might be formed to finance restoration, but so far nothing has happened.

Council proceedings of 1952 record the purchase and fitting out of the former RAF Filter Room at Blakelaw Quarry as the Newcastle County Borough Main Civil Defence Control Centre with a purpose built Sub Control being built at Heaton. It remained in use until the stand down of Civil Defence in 1968 after which date it was retained on care and maintenance as the County Borough War HQ. In the 1971 Home Defence Review it was still officially performing this role and in 1974 it was ceded to Tyne & Wear County. The newly formed Newcastle District Council officially designated it as their war HQ but nothing was done to it due to the Council's extreme left wing policy on Civil Defence.

In about 1982 the Sub Control in Heaton was designated as Main War HQ. In 1986 Tyne and Wear

Kenton Bar

County was abolished and the newly formed Tyne and Wear Fire and Civil Defence Authority wanted to turn Blakelaw into a modern emergency centre, a scheme that was halted by the end of the cold war in 1991.

In the mean time, around 1984, it had been rented to the local sea scouts becoming TS Nelson, a use which continued until about 2000 when it was vacated. Once the sea scouts left the small brick blockhouse above the main entrance was demolished and the rubble dumped down the stairwell; there is no evidence of this entrance today. The sunken emergency exit was retained but the doors were welded shut and a metal grille was welded across the entrance porch to prevent unauthorised access. The bunker which now stands in the middle of Moulton Court on the Blakelaw Estate (sheltered housing) between two high rise blocks will not be demolished but the sunken area containing the emergency exit will be filled in bringing it up to the level of the surrounding ground which will be landscaped and turned into a public garden with seating.

Site Visit by Tyne & Wear Museums' researchers on 15th April and 1st of May 2003 and by members of Subterranea Britannica with Tyne & Wear Museums researchers on 1st December 2004.

The main access into the underground operations room at Kenton is concealed in a brick and concrete paneled single-storey structure surrounded by a low brick wall on the west side of the bunker. Internally, this building which housed a small guard post has been stripped of most of the fittings related to its military and civil defence use and has been used as a store. Many of the electrical fittings appear to be original and with the exception of the modern temporary lighting, all of the electrical fittings in the bunker are of similar type.

Further surface features associated with the bunker include ventilation shafts and radio mast bases. The ventilators are in varying stages of decay, and some have lost their characteristic louvered openings.

The stairs to the bunker are accessed through a large door with gastight seal. At the top of the stairs is a large fuse and switch-box for the ventilation system. At the base of the staircase is a corridor, with an airlock. Some of the rooms within the bunker are labelled with their post war functions. A corridor runs around three and a half sides of the upper level ending part way along the north side where there is a stairway down to the lower floor. On the south side of the bunker there is a second stairway down at the same point but also a short stairway up to a continuation of the upper level corridor.

Most of the rooms throughout the bunker have been cleared of all fixtures and fittings and as the room layout does not exactly match that of the standard design war room it is not possible to determine what many of the rooms were used for during this period.



Newcastle City Council workmen cutting the welds of the gate to allow Sub Brit members access to the Group Control Filter Room at Blakelaw

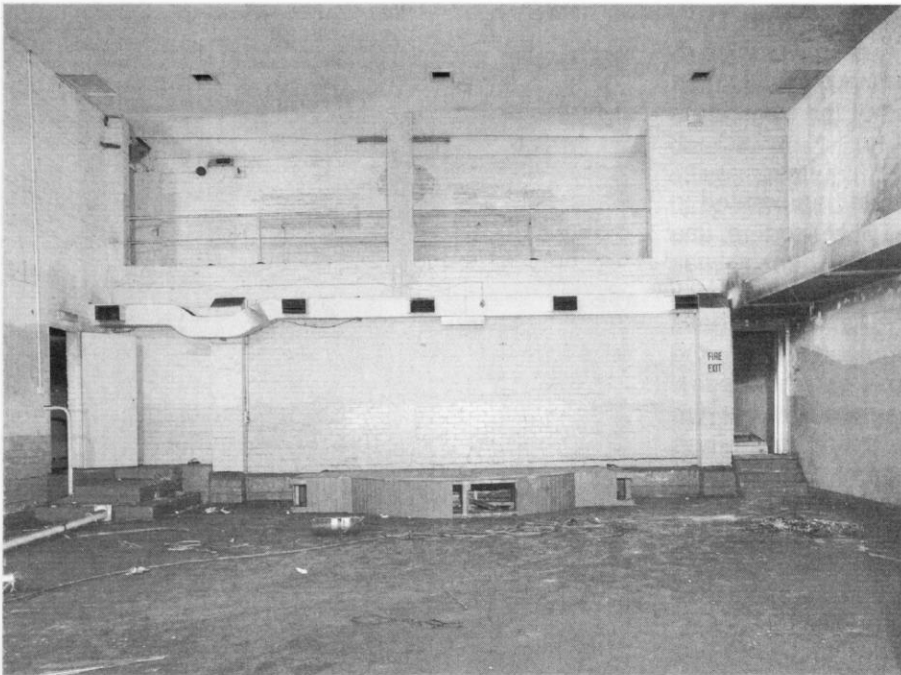
The main plant room is at the west end the upper level, this is still largely intact with the ventilation and air filtration plant required to keep the air in the bunker circulating. The large Porton Filters are still present and in good external condition, as are the electric pumps and their associated switchgear. The plant appears to date from WW2 being refurbished for the 1950's war room.

Close to the stairs on the north side two large sections of an operations table with the original edging, covering the area from Holy Island to Seaham, and Whitby to Filey. This is part of the table used in the 1950s Regional War Rooms and does not date from WW2. Other sections of the map table can be found in adjacent rooms.

One of these rooms which overlooks the operations well on the floor below has acoustic telephone booths along one wall, as the east wall of the room was absent, leaving it open to the Operations Room it is assumed there was originally a glass window here, the same applies to the adjacent room. There is a large of fire brigade mobilisation boards on one wall relating to pump availability, pump movements and other equipment.

Close to the stairs on the southern side there are two blackboards leaning against the wall. One of these had a sketch map showing the location of assembly points and command centres in East Durham.

Kenton Bar



The Operations Room in the Group Control filter room at Blakelaw.

The male and female dormitories are at the east end of the upper level one room still being labelled 'Ladies Sleeping Quarters'. Close by are the male and female toilets. The female toilet has two WC cubicles and the male toilet has one cubicle and an 'Adamsez' enamel urinal.

has been identified as the AA liaison officer's cabin and in the centre was the controller's cabin. There is a further formerly glass fronted viewing area on the north side of the operations room

The lower floor is smaller with a corridor running around three sides. The heart of the bunker is the two

level operations room. This has been stripped of many of its original features, including the floor. The original art deco ceiling lights are still in place which are still accessible via two gantries which run across the underside of the ceiling.

The large room behind the operations room has further acoustic telephone booths to the south wall and a central service lift up to the AC office above; it also has windows looking into the adjoining rooms and appears to have been a central communications area from which messages could be circulated around the bunker.

There is a further toilet on the lower level with a large Belfast sink with a single WC cubicle. Next to this there is a small room containing the sewage ejectors.

At the north east corner of the lower corridor a stairway leads



The Regional War Room/Group Headquarters Operations Room with the three control cabins which would have overlooked the plotting cable on the floor below.

Kenton Bar

directly from the lower floor to the emergency exit on the east side of the mound above. There was a pair of gas tight doors at the bottom of the stairs. On the surface the emergency exit consists of a small brick blockhouse with a metal door.

The battery room at the east end of the lower floor is lined with Darlington Tiles throughout in case of an acid spill. The batteries are in position along the east wall, and there are tables and work benches along the west wall. Some maintenance logs for these batteries are still in the room and record the last periodic check of the state of the batteries as having taken place in June 1968.

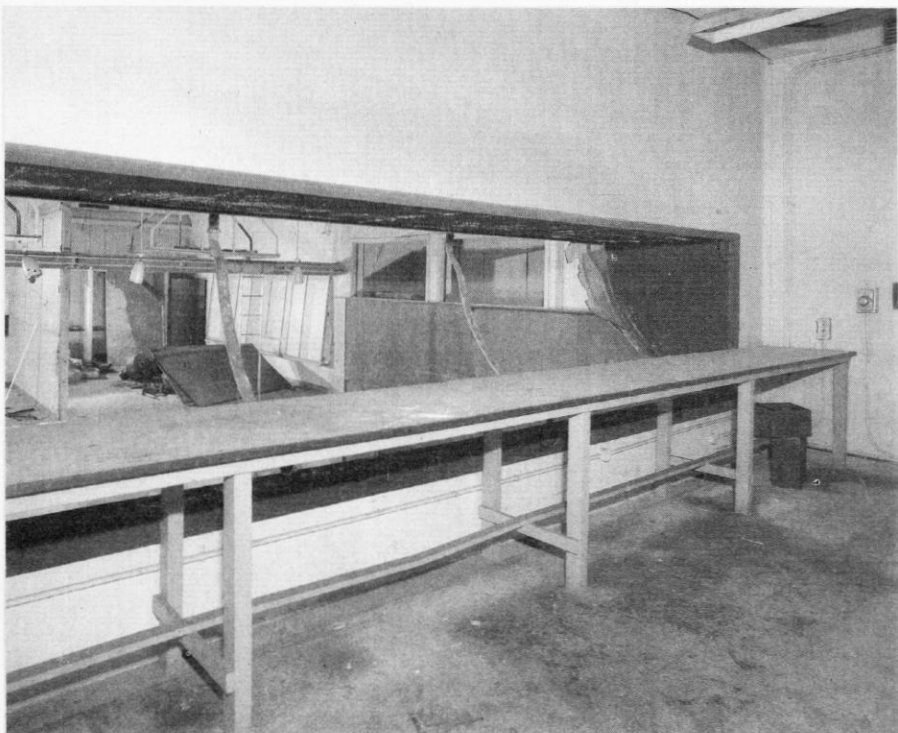
The normal war room design included the standby generator within air conditioning plant room but as Kenton utilised the former RAF Group HQ the original standby set house was also reused. This stands on the east side of the compound and is now used by Northern Electric Distribution as an electricity substation.

The filter room at Blakelaw was visited by members of Subterranea Britannica and Tyne & Wear Museums researchers on 1st December 2005. The bunker is located within a secure compound the gates of which have been welded shut. A council maintenance team arrived on the morning of the visit to cut the welds of the gate and to cut the welds off the emergency exit door into the bunker which is located in a sunken area on the north side. Once inside the bunker there is a short flight of steps down to the upper corridor. At the top of the stairs there is a small room to the right where a small generator has been installed by the sea cadets during their occupation of the bunker.

The upper corridor runs around



Air conditioning plant room in the Regional War Room/Group Headquarters



Inside the Controller's Cabin in the Regional War Room/Group Headquarters, looking through the window into the operations room.

Kenton Bar



The main entrance to the Regional War Room/Group Headquarters

the north and east side of the upper floor and part way round the south side to a point where it enters the upper level of the operations room. There are two stairways down to the lower level one on the north side of the bunker and another on the east side. All the rooms on the upper level, apart from the toilets

side there is a small room containing electrical switchgear which probably dates from the 1950's when the bunker was used as the main civil defence control for Newcastle County Borough, close to this room is the backfilled stairway down from the demolished main entrance. At the bottom of the stairway is a small room with a hand written notice on the wall relating to the timings of a Colour Ceremony performed by TS Nelson.

have been stripped of all original fixtures and fittings with the exception of ventilation trunking which is still in place in some of the rooms through the bunker; many of the rooms have been altered for use by the sea cadets. One of the small rooms close to the emergency exit has been converted into a strong room with a secure steel door, inside this room there are a number of original cables, now cut off as they pass through the wall into the room. An adjacent room has been turned into a recreation area with a bar. At the west end on the north

The lower corridor is similar running around the north and east side of the side of the bunker and entering the operations room half way along the south side. On the north side the corridor continues down a short flight if steps into what was the ventilation plant room. Here there is evidence of ventilation trunking and there are a number of concrete machine beds still in place. The two level operations room was used as the 'deck' of TS Nelson and a short flagpole is still



Communications Room in the Regional War Room

Kenton Bar



Original painting of the Operations Room

there lying on the floor. A small stage has been constructed to one side of the room indicating it has also been used for social functions by the sea cadets. Again, all original fixtures and fittings on the lower level have been removed and one of the rooms has been converted into a kitchen. There is some standing water on the lower floor at the east end and some fire damage to furniture and a partition wall in one of the rooms.

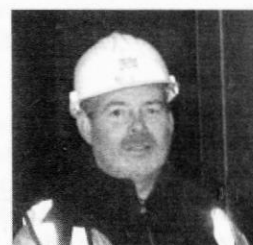
Once a full survey of the bunker had been made the emergency exit door and grille and the entrance gate to the compound were rewelded by the council contractors.

I would like to thank Fred Garratt & Julie Parker from Tyne & Wear Museums Archaeology Department who accompanied us on both visits and brought a generator and temporary lighting, also Newcastle City Council who arranged to have the former filter room at Blakelaw opened for us.

Text extracted from Archaeological Report by Tyne & Wear Museums with additional text by Nick Catford.



Julie Parker



Fred Garratt

Sources:

Archaeological Report on the Former 13 Group Fighter Command Headquarters Kenton Bar by Tyne & Wear Museums

Bob Jenner

Keith Ward

Air Vice-Marshal Sandy Hunter
Operational Record Book (PRO)

Various PRO files

Various Proceedings of Newcastle upon Tyne Council 1938 – 1954)

All Photos By Nick Catford

Warning The Public

An article originally published in the Telecoms Heritage Group journal In 2003

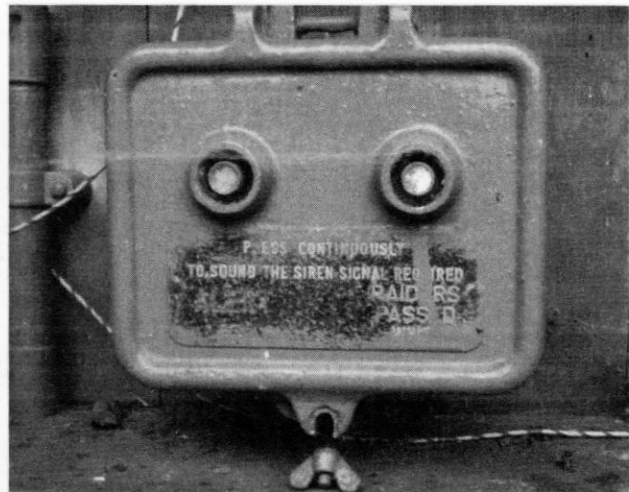
From the early sixties until the early nineties at precisely 9 o'clock, the frequency of the tones used to supply the standard GPO time service TIM's 3 "pips" – ("at the third stroke") – changed from its normal 900hz to 2500hz.

This relatively small and normally unnoticed change in the tones was part of the engineering test and monitoring process of Britain's "semi secret" telephone line based Nuclear Early Warning System. The system was not military however and its sole purpose was to warn the general populace (you and me) of impending doom! The government publication UKMWO stated "As far as the system described in these pages is concerned, experts have calculated that its contribution could amount to the saving of as many as six to ten million lives - simply by warning enough people in time!"

Whilst the system and its workings are no longer "secret" – (the entire system was dismantled in 1992 at the "end" of the Cold War) – I do not intend to cover any political aspect but merely try to explain its workings and hence its part in our telecommunications heritage .

EARLY DAYS

The System consisted of two distinct parts, that which communicated the attack warning from RAF Strike Command to the control points (Police Stations) and that which passed the warning to the thousands of warning points across the country.

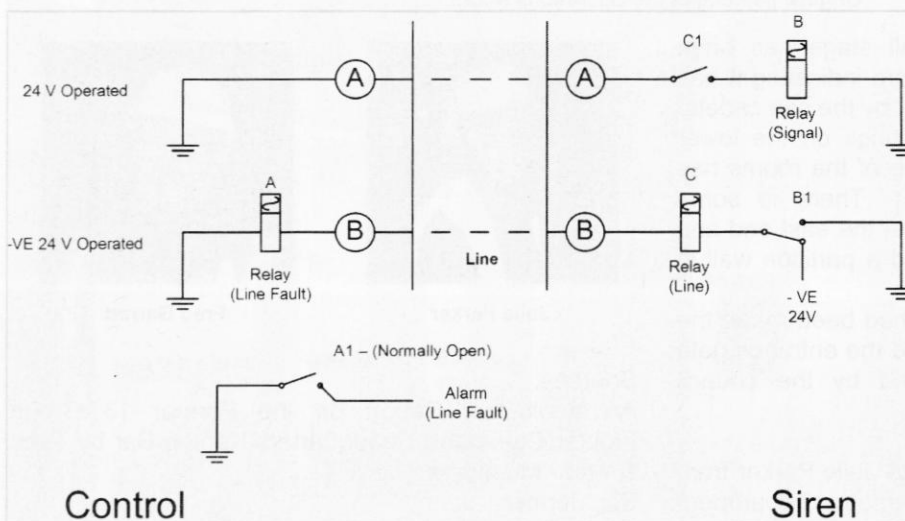


Manual Siren Control

device the "Autowailer" this was a motor driven device used to supply the timing of the 3 main signals "Air Raid" "Raiders passed – all clear" and "stop" The GPO lines were solely used to communicate these signals to the Siren equipment.

In its normal state the A and B wires are connected to earth at the control point, at the terminal end the A wire is connected to earth and the B wire to negative 24 volts. The line relay "C" on the B wire remains operated and contact C1 holds signaling relay "B" in an un-operated state. Relay "A" at the control point is also operated and this is used to detect any line faults or power failure of the equipment at the terminal end.

In its operated state the earth on the A and B wires at the control point are replaced with positive 24 volts and negative 24 volts respectively, this releases the "A" and "C" relays operates the "B" signalling relay at the terminal end a contact of which is then used to switch the 3 phase mains supply to the siren. Wherever possible the equipment at the terminal end was located inside a building, normally with the siren on the roof , however in some locations a "street cabinet" was used , painted green similar to GPO cabinets but looking more like "power" cabinets they were 4 ½ feet high by 5 feet wide and 1 foot deep.



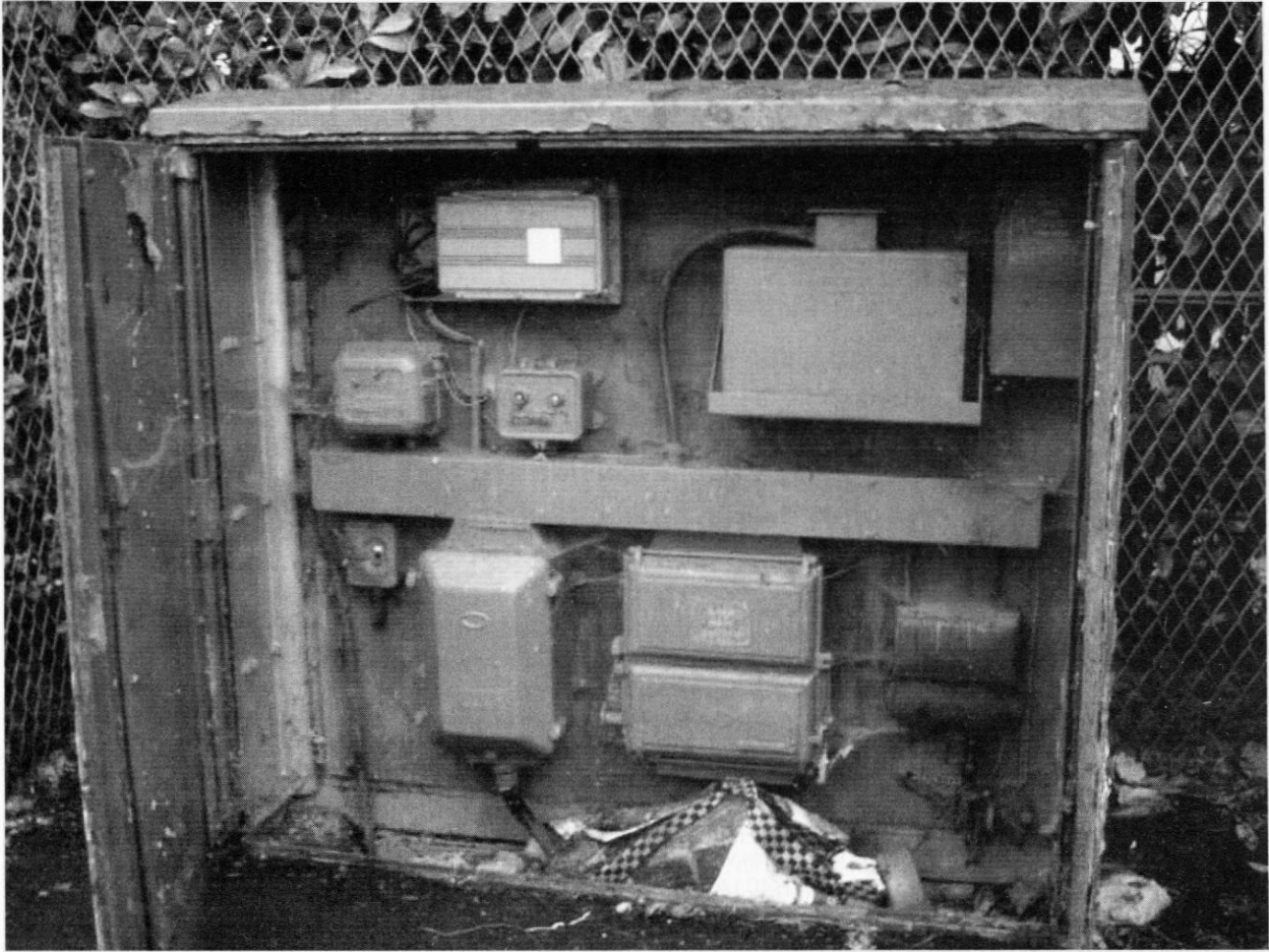
System E Circuit Diagram - Shown Un-operated

Following World War 2, the early basic system was known as SYSTEM E. It used DC signaling along private wires from control points (normally Police Stations) to the terminal Points (Sirens) . Each control point housed a Home Office supplied

ALL CHANGE

In the early sixties SYSTEM E was phased out and replaced with a carrier based system (carrier systems us signals not normally audible to the human ear "superimposed" over the top of normal speech

Warning The Public



The photo shows a siren control cabinet still existing at the side of the road in South London Within the cabinet can be seen various items, top left is the siren control panel, top right is the GPO equipment and at the bottom of the cabinet is the main power equipment and switchgear a mains powered heater was also installed. Above the siren controls can be seen a retro fitted "WB1400 receiver" (a WB600 would have been mounted here until the early eighties) as this cabinet remained in use right up until 1992!

signals so as not to interfere with normal conversation or signalling). The early carrier systems used on "line" links were known as "WB" or "Wire Broadcast" systems.

The System for alerting the "Carrier Control Points" (the same Police Stations used by SYSTEM E) of which there were 250 spread across the country, was known by the code word "HANDEL" and was cleverly designed to be sent "over the top" of the existing network around the country that was used to distribute the "TIM" time signal, the reason for this was two fold, one: the network already existed and would therefore save time and money and two: it was a monitored network and would therefore need no separate fault monitoring or reporting should anything go wrong.

The System was then effectively split into two the latter part of the system connecting the carrier control points to the some 18,000 warning points over "normal" subscribers lines using the same philosophy of fault reporting as above – i.e. the customer would

report any faults on their line, therefore negating the need for any monitoring system (unless they worked for the GPO the unsuspecting subscriber had no inkling their line was connected to such a system).

The Carrier Control Points were also connected to some 4000 "warning recipients" (Civil Defence HQ's, Hospitals and the public utilities etc) and nearly 900 ROC (Royal Observer Corps) underground posts all of which had "carrier receivers" in order to receive the broadcast warning.

HANDEL

The carrier system was sub divided into two separate but mutual systems, WB600 was used to control the Air Raid sirens and WB400 was the means by which speech and warning signals (tones) were sent to the various carrier receivers at warning points. The system used a 72Khz carrier, permanently sent down the line, this was then modulated with an AM (amplitude modulated) speech and signal tones, for reception and demodulation at the carrier receiver.

Warning The Public



Receiver Carrier WB400A

The same carrier could also be modulated with two tones (G and S) to control the switching of the sirens. The most familiar part of the system, at the carrier control point (Police Station) was the unit with 3 handsets known as the "Operating unit WB401A" the two grey "700" type handsets were connected to the duplicated link to the "TIM" distribution system, the link was duplicated for back up reasons, and were known as the "X" and "Y" paths. The black Bakelite handset was connected to the nearest ROC group headquarters for onward distribution of "fallout warnings" to warning points. Picking up either of the "700" type handsets in a "non war" situation would have resulted in the normal "TIM" time signal being heard

An attack warning from RAF Strike Command would be preceded by two tones (P -2400hz and Q - 2600hz) which signaled the WB401A to receive a message by sounding an alarm on the unit. The "war" officer at the Police station would then lift one of the "X" and "Y" path handsets (either one would do) to receive a spoken attack warning, the system had no facility to "talk back" to RAF Strike Command .

Mounted below the WB 401A was an "Operating Unit 400A" – normally on a table – this was the method by which the officer passed on the warning of attack/fallout to the warning point carrier receivers, there was no direct link between RAF Strike command and the "public" side of the system, all messages being relayed via the Police Control Points. The ROC posts however had direct links to their respective Group controls on dedicated Emergency Circuit Private wires but this was an entirely different network..

The War Officer upon receiving the message from RAF Strike Command would operate one of three switches on the WB400A "Warning" "Speak" and "Call", Warning and Call sent a series of pulsed tones to the warning points which were received on the "Carrier Receiver 400 A" to alert the warning officers, then operating the Speak key allowed the spoken warning to be re broadcast to the now alerted Warning Officers. Warning Officers would then pass on the respective warnings using hand sirens and maroons (sometimes even whistles and rattles) to the general public.

Between the handsets on the WB401A was a control unit used for setting off the Power Sirens. The unit "Control WB600A" generated the two tones used to modulate the carrier (S – 1500 hz and G – 2160 hz) and switch the siren controlling equipment at remote locations. To initialize the Siren circuit tone "G" was sent for 10 seconds pulsed 0.4s on and 0.4s off . The " attack warning " was tone "S" for 4s on and 4s off and an "all clear" was signaled by 60 seconds of "S" continuous. In the photograph the button nearest the two grey 700 handsets, is "all clear" the centre button is "stop" and nearest the bakelite handset is "attack warning" near to the centre handset can be seen a lock switch, the key to which was held in a "break glass in emergency" container.

In the apparatus room of the Police Station the tones were generated by oscillators in a "Unit signaling WB600A" this unit had a duplicate "Unit Control 600A" as a backup for setting off the sirens. Also in this room would have been a "Unit equipment carrier WB404A" which generated the tones and controlled the speech link to the WB400 carrier receivers at warning points. Both the above items were mounted in heavy grey steel cabinets 6 feet high by 2 feet wide. The 72Khz carrier was also generated here. At the remote siren location was a "Receiver Carrier WB600" a picture of which is shown RIGHT

The line from the Police Station was again connected (via the local exchange) to the remote siren site using an unsuspecting "normal" subscribers line into a standard GPO street cabinet nearest the siren, a filter WB600 then split the line, between the customers line to their premises and the line feeding the siren control unit.

Within the WB600 receiver, the 72Khz carrier and associated tones were amplified and filtered by electronic circuitry, the filtered "G" pulsed tone was then detected by a cleverly designed "Pendulum Relay" the pendulum action prevented the system being inadvertently set off by speech signals on the line. Approx 6 seconds of pulsed "G" allowed the pendulum relay to swing enough to make contact, this operated the "S" tone circuit. A relay in the "S" tone circuit then subsequently operated the siren mains supply contacts.

Mounted adjacent to the WB600 receiver was also

Warning The Public

(as per SYSTEM E) a Home Office supplied "Autowailer" for manual operation of the siren. The tones generated by the WB600 system could also be heard on the WB400 receivers at warning points. Before the lines from the Police Station reached the remote sites, they of course passed through the local Telephone Exchange serving the Station. The CCE (Carrier Control Exchange) equipment, consisting of Filters and Combiners for the "TIM" speaking clock feeds, amplifiers, fault monitoring equipment and ongoing distribution units were housed in a large grey or light straw cabinet. The bottom half of the cabinet had a separate section containing batteries for back up use. The cabinet was constructed of heavy steel plate with an airtight seal around a bolted down cover, all cables fed

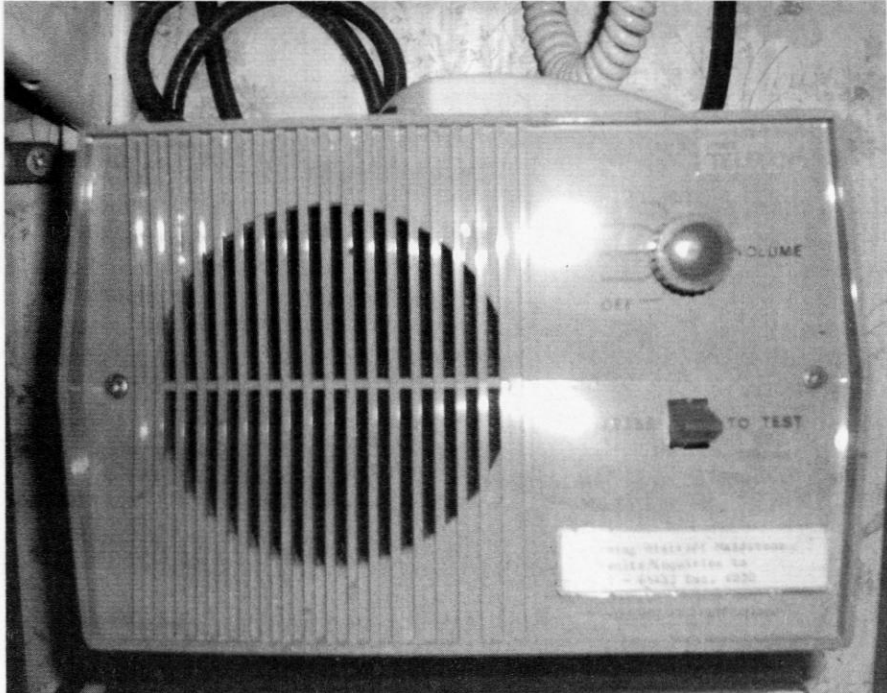
into the cabinet in a large cast iron pipe – strangely however once the cabling reached the cable "grid" atop the Strowger (later TXE 4) equipment the unprotected cables then wended their way across the grid to the MDF, power feeds and the "TIM" network! – many engineers never could see the irony of this arrangement.

WARNING POINTS

At each of the remote sites (Warning Points, Warning Recipients or ROC Post/Control) the line terminated onto a filter and then onto the "Receiver Carrier WB400". This grey metal cased unit was the part of the system visible to the public. It was also of robust construction, with a cork seal and plastic membranes protecting the speaker, the interior contained a desiccant. (Although how this would have stood up to a nuclear blast was thankfully never put to the test!!) The unit had a drawer (similar to 200/300 type telephones) that contained an instruction card to be used in time of war! The reverse of the card gave routine testing details. When turned on but not receiving any signals/messages the unit gave a regular pulsed "tick" known as the "confidence tick" basically to let the recipient know it was on and working.

LATTER DAYS

In the early Eighties the entire system of WB600 and WB400 was replaced and updated with a combined system the "WB1400". The earlier WB600/400 equipment had never been designed to be protected



Receiver Carrier WB1400 - Along with a receiver Signalling WB1400/1401 This replaced the Receiver Carrier 400A

against an effect of a nuclear explosion called the EMP (Electro Magnetic Pulse). This pulse could wreck all electronic equipment within a large radius by destroying all semi-conductors (transistors) within. Equipment could be protected from harm by a "Faraday Screen" (basically an earthed metal case). The combined WB 1400's electronics were contained in large sealed metal cases All the equipment mentioned earlier from the Police Station, both the WB401A/400A and all the cabinet mounted apparatus in the equipment room were replaced with one single unit the "Equipment carrier WB1400"

At the warning points the WB400 Carrier Receiver was replaced with a separate metal cased receiver and loudspeaker unit " Receiver Speech WB1400 and Loudspeaker unit WB1400".

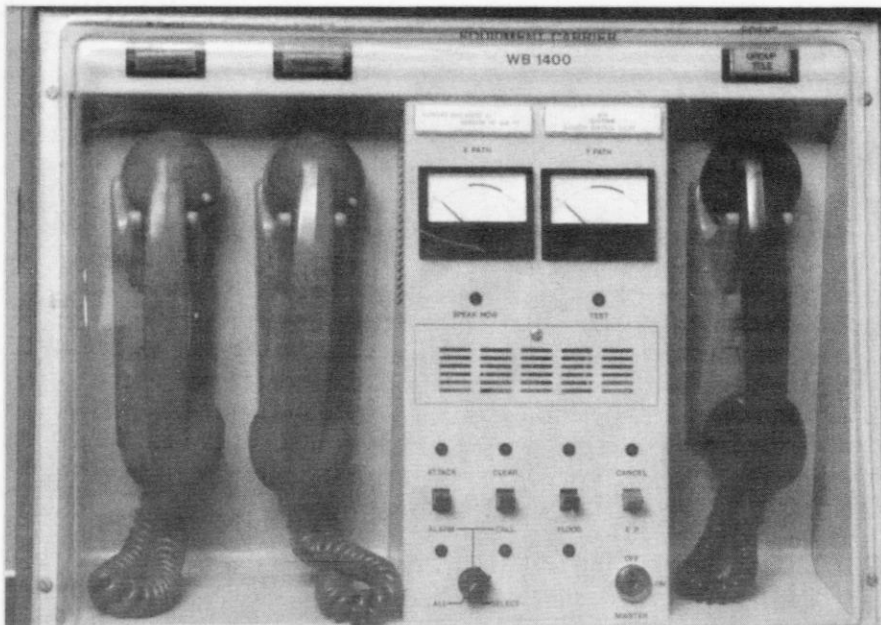
At remote siren sites the WB600 unit was replaced with an identical looking "Receiver Signaling WB1400" but no loudspeaker.

WB 1400

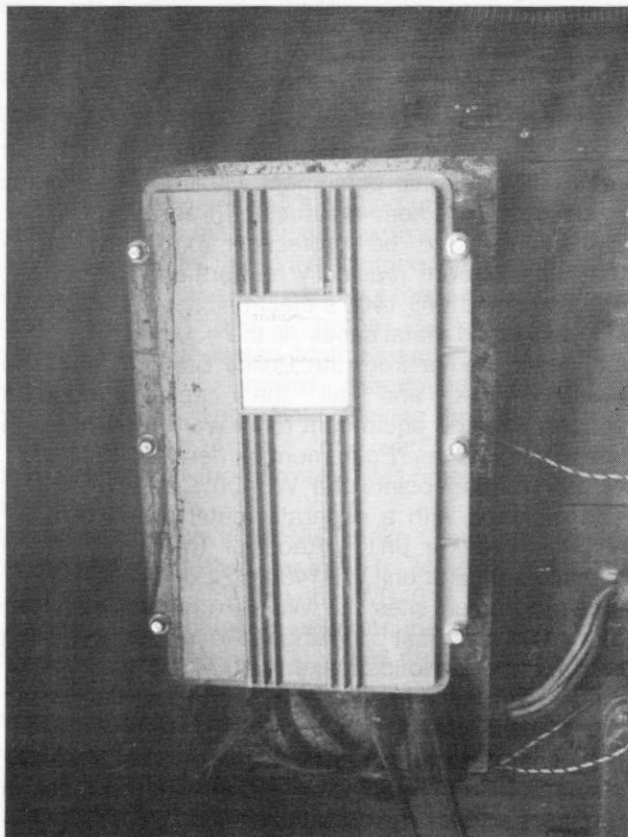
The later WB1400 system used the same 72 khz carrier and signaling as the earlier WB400/600 so a relatively seamless changeover could occur. The main differences were the aforementioned EMP protection, line powering to eliminate the need for constantly changing batteries and extra signaling, (including "flood" warnings). The WB400 receiver was powered by a battery, which often went flat, the units having been left on in error, (the units should only be turned on for use or testing).

The WB1400 receiver however was permanently "on"

Warning The Public



Equipment carrier WB1400 this replaced the Carrier 400A and 401A



Receiver Signalling WB1400

in standby mode, the internal battery being "trickle charged" by a line current. An extra tone signal (pulses of 620 Hz) sent from the WB1400 control point would "alert" and turn on the receiver ready to receive further signals or speech.

ROC POSTS

Lines installed into ROC (Royal Observer Corps) posts also had means by which the observers could communicate directly to their Group control and other posts. The equipment which shared the same pair of wires as the WB equipment was known as "Teletalk". This was an "intercom" system permanently on receive that required the pushing of a button on the unit to speak.

Early WB400/600 era units were known as "Unit Intercom AD 3460" (AD stood for Air Defence) and used two batteries 67.5v for signaling and 6v for speech. The later WB1400 era version "Loud speaking Telephone AD 8010" was line powered. Both units required the use of a filter

between itself and the WB carrier receiver .

Many of the lines to ROC posts were only live when required and during testing. Known as EC or Emergency Circuits the lines were switched or "turned on by either engineers or traffic staff. Each exchange that served a "post" was equipped with a "Unit Observer Post Switching", a written form THQ 2775 was submitted to the GM (general manager) of the respective telephone area by the ROC in order to request the lines to be turned on!

This believe it or not was a "cost exercise" the ROC not being charged for the lines when not in use ! .

FLOOD

In areas that so required it the system was also equipped to warn of flood. The originally separate WB601 Flood warning system was incorporated into the WB1400 system, although in some areas (especially London and the Thames) "WB1401" carrier receivers were used where the flood siren was unconnected to the Air Raid system (confusingly "1401" was also used to describe a more robust speaker unit "loudspeaker unit WB1401" used in damp areas in place of the normal "loudspeaker unit WB1400").

The flood signaling used the same network and carrier, with differences to the signals and timing (of the siren) In flood alerts the "G" signal was sent for a pulsed 115mS on and 115mS off. This part of the system was controlled from the Police Station "Carrier Control Point".

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Website: <http://www.phoneman.org>

The Anchor Inn, Salterforth



Those in the Society with long memories will recall a "Study Weekend" in Lancashire, some years ago. We were lucky with the weather and ended with a hilarious canal trip through the Foulridge Tunnel on the Leeds and Liverpool Canal, culminating in lunch at the Anchor Inn, Salterforth.

A few weeks ago on walk, we called at the Anchor for lunch. Much to my astonishment and embarrassment for the Sub-Brit trip, I found that the pub has a two-story underground cellar of considerable interest.

The Anchor was built in 1655 on an old packhorse way used by drovers and salters, bringing salt from Cheshire. The name of the village reflects its importance to the salt trade. It was then called "The Travellers Rest". In the early 1790's the canal was built and part of the pub was below water level. When the road level was raised to serve the wharf and to give easy approaches to the new canal bridge, the surface of the road was extended across to the pub on arched masonry and a new building put on top of the old pub, which was renamed the Canal Tavern. Thus the present bar area was level with the old living accommodation and new accommodation was built above. The old bar area became the new cellars. The original front door is still able to be opened and leads to a section of the original packhorse road for the length of the front of the pub. This is blocked at the eastern, canal end and has

been bricked up at the west or carpark end. A forest of straw stalactites descends from ceiling to near the floor, some only an inch off being a slim column. There are also some stubby stalagmites on the road surface.



The original cellar is also accessible, although flooded to near knee depth. There are no formations down here. Attempts to pump this out have been unsuccessful, as it must have a connection to the canal. The pub was renamed "The Anchor Inn" around the turn of the 19th Century.

Ken Geddes 13th March 2005

Health and safety notes - underground air quality



Although the air quality in the underground spaces usually visited by members of Subterranea Britannica is generally excellent, members should be aware of possible hazards. The nature of potential dangers is not always obvious. Although 'bad air' accidents underground in the UK are almost vanishingly rare, all those going underground should be aware of the risks, however small. Especially the now recognised risks posed by carbon dioxide.

Air

Normal atmospheric air is (ignoring the variable water vapour content) approximately 79% nitrogen, 21% oxygen, and 0.03% carbon dioxide. Exhaled air is about 79% nitrogen, 17% oxygen, and 4% carbon dioxide. All figures are percentages by volume. Exhaled air contains sufficient oxygen to sustain life (so mouth-to-mouth resuscitation is effective) and insufficient carbon dioxide to endanger life in the short term. Carbon dioxide, however, rather than depleted oxygen levels, is probably the greatest and most insidious threat to life underground.

Oxygen is essential to support respiration and combustion. Pure carbon dioxide and pure nitrogen will extinguish naked flames. Carbon dioxide levels above normal, for any length of time, are exceptionally hazardous.

Foul air

Foul air can be defined as (a) containing more than 0.5% carbon dioxide by volume; (b) containing less than 18% oxygen by volume; or (c) containing toxic pollutant gases.

Pollutant gases and conditions encountered underground

Underground air may contain, in addition to the gases already noted as normal constituents of the atmosphere, ammonia (NH₃), methane (CH₄), and hydrogen sulphide (H₂S). In places where explosives have been used or underground fires or explosions have taken place, carbon monoxide (CO) and various of the oxides of nitrogen such as nitrogen dioxide (NO₂) may occur. Some of these have strong and unpleasant smells, warning of their presence, although in higher concentrations they may anaesthetise receptor nerve endings rendering them effectively odourless. Two of these gases, within certain percentage limits when mixed with air, form flammable or explosive air-gas mixtures.

Ammonia

This is probably the least likely pollutant to be met with. It has an extremely strong smell, and probably derives from the nitrogenous compounds such as proteins in decaying organic matter. **Dead animals and plant materials encountered underground should be treated with great caution, although the biological hazards they may present, as sources of pathogens, are likely to be of greater concern than ammonia.**

Methane

This is an odourless, non-toxic gas, and occurs naturally in coal seams. It is also generated by decaying organic matter. The risk is from fire and explosion, not poisoning. Air / methane mixtures containing anything between 5 and 15 per cent methane can be ignited and will explode. Naked flames and anything that might generate an electric spark should be avoided where methane may be present. Although methane explosions are generally associated with coal mines, it is worth remembering that the violent explosion in a newly built underground water storage chamber at Abbeystead, with the resultant loss of 16 lives, in 1984 was not related to coalfield methane. Methane is also given off in large quantities by domestic refuse in landfill sites, and is known to be able to migrate horizontally through fractured rock seams - a row of houses at Loscoe in Derbyshire was demolished in 1986 by the explosion of migrating methane from a landfill site. Methane given off by stagnant river-bed deposits was one of the difficulties the Brunels encountered in driving the first Thames Tunnel. **Coal and oilshale mines, decaying organic material underground (which may of course include timber pit props, stemples, and staging), and underground spaces anywhere close to landfill sites or stagnating waterlogged deposits containing organic matter are best avoided or treated with extreme caution.**

Health and safety notes - underground air quality

Hydrogen sulphide

Hydrogen sulphide, the well-known active ingredient of stink bombs, has a grossly offensive odour of rotten eggs, and is on a par, in terms of toxicity, with hydrogen cyanide (prussic acid) vapour, sometimes used in some countries for execution. It anaesthetises the sense of smell at high concentrations or after a period at low concentrations, so any hint of bad eggs should be taken seriously as a warning of danger. It is most likely to be found in mines in clays or shales, and also coal, containing iron pyrites (iron II disulphide) or decaying organic matter (most proteins contain some sulphur.) Hydrogen sulphide given off by stagnant river-bed deposits was one of the difficulties the Brunels encountered in driving the first Thames Tunnel. **Decaying organic matter, again, should be avoided. Mines in clays, coal, or coal (especially), and metalliferous mines containing sulphide ores should be treated with caution. Also voids in or near made ground or stagnant organic-rich sediments.**

Carbon monoxide

Carbon monoxide is odourless and exceedingly toxic (it was the toxic constituent of old-fashioned town gas made by the destructive distillation of coal in gas works.) It is formed when coal, coke, methane, or any other fossil fuel (including hydrocarbon mixtures such as butane, propane, diesel fuel, paraffin, petrol, and the like) are burned in an inadequate supply of air for complete combustion. This occurs in internal combustion engines, of course, the fuel vapour being oxidised mostly to carbon dioxide, but in part only to carbon monoxide. **Places to avoid are closed or poorly ventilated spaces containing running internal combustion engines, gas or petrol fires or stoves and the like, and places in which fires have occurred (such as the combustible contents of bunkers set on fire by vandals), and coal-mines after underground fires or explosions.**

Nitrogen oxides

There are at least five oxides of nitrogen, including one that is relatively harmless (odourless nitrous oxide N_2O is better known as 'laughing gas' and used as an anaesthetic), one (nitric oxide NO) that reacts with oxygen forming nitrogen dioxide NO_2 , and two that are volatile liquids or solids (N_2O_3 and N_2O_5 (both distinctly smelly)) Non-chemists may wonder at such a strange family of compounds, all composed of exactly the same elements found, mixed rather than chemically combined, in fresh air! Nitrogen dioxide (some people seem to think it smells a bit like chlorine or bleach) is probably the most relevant in the present context. Nitrogen dioxide is most likely to be encountered where explosives have been used underground. Virtually all commonly used mining

explosives include nitrogen compounds, from gunpowder to nitroglycerine, dynamite, TNT, and ANFO (ammonium nitrate / fuel oil mixtures.) (An exception is exemplified by compressed carbon dioxide cartridges used for blasting.) **Stay clear of mine or tunnel workings for a period of time after explosives have been used for blasting.**

Carbon dioxide

Carbon dioxide is released by combustion of almost all fuels other than pure hydrogen, by fermentation and respiration, and also occurs naturally in some 'sparkling' mineral waters and cold-water springs. It is of course familiar as the bubbles in fizzy drinks, and is the gas that makes bread and cakes 'rise.' And above ground, as it diffuses away rapidly and is diluted by the air, it is not a cause for concern.

Underground, however, it is now being recognised as a major potential hazard. Although odourless and, on the face of it, not poisonous, carbon dioxide in raised concentrations can have quite disastrous effects on people, up to and including death.

Carbon dioxide, besides being an excreted product (along with water) of respiration, has a feedback function in *regulating* respiration. It also decreases the pH (that is, it increases the acidity) of the blood plasma, with severe adverse effects. The warning signs of dangerously high concentrations are increased pulse and breathing rates, followed by clumsiness and severe headaches.

Industrial regulations have been cited as specifying a maximum permissible level of 0.5% carbon dioxide by volume for an eight-hour working day. Five per cent or above is immediately dangerous to health and life. A carbon dioxide concentration of 10% causes respiratory paralysis and death within limits. It is the high carbon dioxide level, rather than the reduced oxygen percentage, that does the damage. Air with oxygen levels as low as 10% (assuming also a safely low carbon dioxide level) can sustain life satisfactorily in the short term (Smith, 2003.)

Sources of carbon dioxide include, naturally, the persons underground themselves, a hazard to themselves in a crowded, confined or unventilated space for any length or time. Open flame lamps (burning acetylene generated from calcium carbide and water) naturally produce carbon dioxide (and indeed carbon monoxide if the oxygen supply is insufficient.) A less obvious source of the problematical gas is bacterial decay of organic material (including for example dead leaves), or the respiration of living plants. An under-appreciated risk is posed, for example, by tree roots in the soil around

Health and safety notes - underground air quality

near-surface underground spaces. Those who were not fully attentive during their school biology lessons may retain the erroneous impression that all that green plants do, as the good guys, is *absorb* carbon dioxide from the air, and *release* oxygen in its place. However, this process (photosynthesis) takes place only in sunlight and in the green parts of the plant above ground. Plants also respire, just as we do, using up some oxygen and excreting carbon dioxide, as a means (like us) of releasing energy. The roots of plants, as well as other parts, respire and may thus add materially to the carbon dioxide level of air in underground spaces.

Carbon dioxide is 1.57 times denser than nitrogen, and 1.38 times denser than oxygen. Still air behaves more like vodka than milk, in that the denser component (water) will not settle to the bottom, leaving pure alcohol (or cream) floating at the top! A container full of air will not form a layer of carbon dioxide at the bottom. However, attentive students will recall demonstrations in school chemistry lessons than beakers full of carbon dioxide can be quite effectively poured from container to container. A pool of carbon dioxide can easily be poured into, or created to fill the bottom half of, a five litre beaker. The invisible boundary is demonstrated by lowering a lighted taper into the beaker: it goes out the moment it dips below the gases interface. Carbon dioxide is known to form ponds or lakes in the lowest parts of holes in the ground. This is best explained by the gas accumulating more rapidly than it can be dispersed by natural diffusion. The sinkers of deep, narrow, wells had to maintain some effective air circulation to be able to work hard, with a naked flame lamp, anything up to 200 feet or more down the well, in safety. Sometimes limewater (a solution of calcium hydroxide) was thrown down the well to absorb the life-threatening carbon dioxide.

If descending vertically, be aware that you could enter ponded carbon dioxide. If not roped up, you could simply lose consciousness and fall to the bottom of the pitch. If on a rope, you could be hauled to the surface and, with luck, revived. A large knot at the lower end of an abseil rope will prevent you from falling off the end, and allow you to be raised.

The low oxygen / high nitrogen scenario

Rather more dangerous, as it gives no warning, is mine air with a normal and safe carbon dioxide content, but depleted in oxygen and correspondingly rich in nitrogen. This is likely to occur where some chemical process is absorbing oxygen from the air, but releasing no gas in exchange. It seems most likely in metalliferous mines for sulphide ores, or

other contexts, where minerals such as iron pyrites (iron II disulphide) are oxidised and hydrolysed to the corresponding sulphates (the Parys Mountain mines in Anglesey display a spectacular array of copper and iron sulphate minerals.) Low oxygen / high nitrogen gives no physiological warning signs, and death by asphyxiation is exceedingly rapid. **Beware of very poorly ventilated and long-sealed spaces**

Nitrogen

Nitrogen as a normal constituent of air and at normal atmospheric pressure is not a problem. It is, however, a serious hazard in two circumstances. Under higher than normal air pressure, nitrogen will dissolve in the bloodstream. Whilst it remains dissolved, it is still not a problem. But as the air pressure returns to normal, the nitrogen comes out of solution again forming, if this pressure reduction is allowed to occur rapidly, large numbers of very small nitrogen bubbles throughout the circulatory system, resulting in a painful and dangerous condition known as 'the bends.' People building tunnels under waterlogged ground may have to work in compressed air, as this is a means of preventing the tunnel from being flooded by groundwater entering the excavation. It is essential, for these people's safety, that they enter and leave their working places via a decompression chamber in which the air pressure can be reduced at a suitably slow rate. This can be quite time-consuming. If you are working in compressed air making a new tunnel under the Thames, you certainly just can't pop out for as quick sandwich, or any other call of nature. Divers breathing normal air, if going to any serious depth, are also susceptible to 'the bends' and have to come up very slowly and in stages as they decompress. An alternative is for them to breath an oxygen / helium mixture instead of normal air. Helium doesn't dissolve in the blood as much as nitrogen does, although it does make grown men's voices embarrassingly squeaky for the duration!

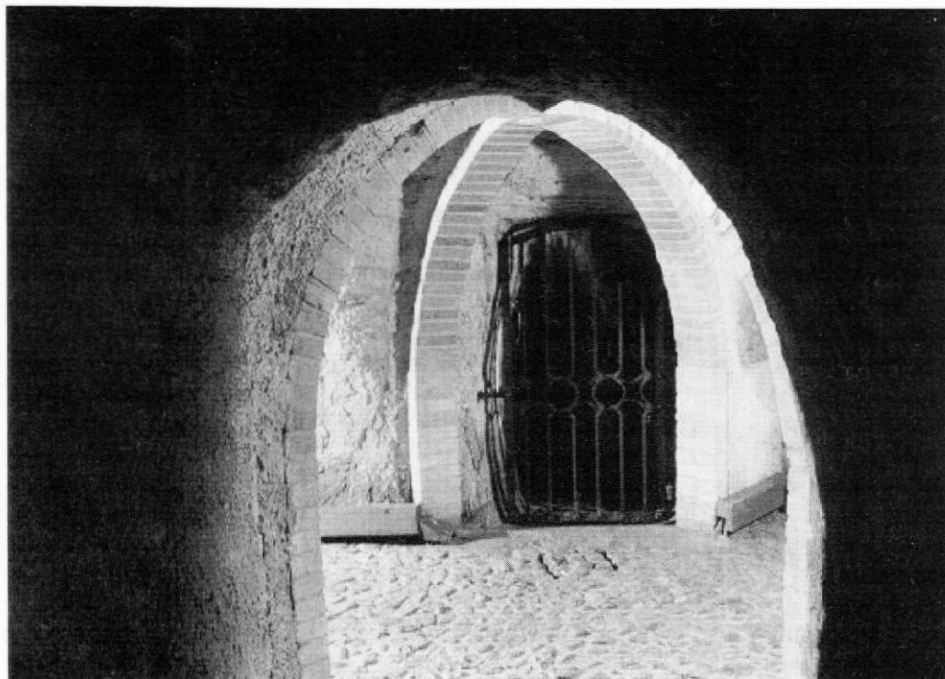
Oxygen

To complete the picture, what about oxygen. One hundred per cent oxygen is a somewhat dangerous material, as even the tiniest smouldering fragment will blaze up quite spectacularly in pure oxygen. So, as a working environment, pure oxygen in effect constitutes a severe fire hazard.

Flame tests

If a naked candle or similar flame in still air unexpectedly goes out underground, or cannot be lighted, this is most likely to be a sign of either high carbon dioxide or high nitrogen levels. (Contrary to popular belief, a number of gases will extinguish naked flames, not just carbon dioxide, although most of them will not be encountered outside chemical

Health and safety notes - underground air quality



Additional notes: ventilation, running water, and the weather

Well-ventilated places are obviously likely to be safer. Running water will tend to carry away gases such as nitrogen dioxide that are very soluble (although bear in mind that running water may also bring in gases such as carbon dioxide.) During bad weather, when the atmospheric pressure is lower than usual, coal seams and other rock strata 'exhale' contained gases such as methane or carbon dioxide more profusely than during good weather. **Treat any confined space, and still**

laboratories or factories.) And, as a chemical curiosity of no real relevance to the current issue, there are materials such as magnesium ribbon which will burn very well in both carbon dioxide and nitrogen (and steam in fact.) **If a candle or the like goes out, or cannot be ignited, leave the area.**

The naked flame test (a butane lighter or a candle is recommended) is not however an infallible indicator of high carbon dioxide levels. Such flames have been demonstrated to be extinguished at oxygen levels below 14.5 %, although human respiration can be sustained in the short term in oxygen levels as low as 10%. So a somewhat oxygen-depleted oxygen / nitrogen atmosphere (without a dangerously high carbon dioxide content) will extinguish a naked flame, but not in fact be an immediate hazard to life.

If you suspect you may be entering an area likely to contain an explosive air / methane mixture, you should not have anything with you capable of making an open flame or an electric spark anyway.

Bats are not a useful guide!

The peculiar physiology of bats, especially while hibernating, is not a safe guide to the safety of underground air. It is known that some bats can survive and live in higher carbon dioxide and / or lower oxygen concentrations than can be tolerated by *Homo sapiens*. Smith (2003) cites an example of bats living in cave air in which a butane lighter flame is extinguished.

or stagnant air, with caution. Bear in mind that in some contexts a fine sunny day is the safest time to visit certain mines.

If you feel any discomfort, in breathing or otherwise, underground, it is time to go.

And finally, make all possible use of local knowledge. **If you are in unfamiliar territory, make a point of consulting the local mining history society, caving club, or similar organisation, and knowledgeable local people, so that you are aware of any specific safety issues. This is also exceptionally important as these organisations or people may well have set up access agreements with land owners or occupiers which might be jeopardised by outsiders visiting 'out of the blue.'** Failure to respect the terms of access agreements may have the effect of access being denied to all..

Conclusions

To paraphrase Smith (2003), underground exploration is generally safer than driving a car or, indeed, crossing a road. You should be aware of the dangers, however slight they may be, and 'if in doubt, get out.'

References

SMITH, Garry K., 2003, Carbon dioxide in limestone caves and its effect on cavers. *Speleology (Bulletin of the British Cave Research Association)* 3, 10 - 12.

Paul W. SOWAN

Maritime HQ Mount Wise



The inner court yard at the end of the dry ditch and the entrance into the Maritime Headquarters.

The area of Devonport, south of the dockyard known as Mount Wise is rich in history and military remains. Very briefly, the founding of the dockyard in the 1690's dictated the areas history from then on. During the early 18th century defensive works, known as 'Dock Lines' were built outside the dockyard walls, encircling them and enclosing an area of housing to the north and Mount Wise to the south. The lines consisted in the main of a wide deep dry ditch that ran from Stonehouse creek in the south to the Hamoaze in the north.

A redoubt was built at the summit of the ridge that ran across Mount Wise and a series of gun batteries were laid out to protect the dockyard and to prevent access to the Hamoaze from Plymouth Sound. This redoubt later became a naval signal station, equipped with a shutter telegraph connecting to the Admiralty in London. A military barracks and a laboratory were built behind the redoubt.

Until the late 18th century, Military control of the Plymouth Garrison was vested in the Military Governor, who resided, with his deputy, in the 'Citadel' to the east of Plymouth Hoe.

Naval control was exercised by the senior Admiral present in the Hamoaze anchorage from his Flagship. The dockyard was under the supervision of an Admiral Superintendent who resided in the dockyard.

This changed, with the building at Mount Wise of a new Government House for the Military Governor and at the beginning of the 19th century Admiralty House, for the Port Admiral who had moved ashore from his Flagship.

The post of Military Governor was abolished in 1842. Government House was then occupied by the army GOC, Western District. By 1915, the military presence on Mount Wise was diminishing with the removal of the Western District (by now Wessex District) to Salisbury, Wilts and the transfer of the whole of Mount Wise, including the redoubt, to the Admiralty. Government House now became Admiralty House, residence of the naval Commander in Chief (C in C), Plymouth and the old Admiralty House became Hamoaze House, later HQ of the Major General, Royal Marines.

Prior to the outbreak of World War 2 in 1937,

Maritime HQ Mount Wise

proposals were made for a protected joint service HQ in the dry ditch near to Hamoaze House consisting of a single storey structure with a 20 ft concrete and shingle overburden.

By 1939, this plan had been widened to provide an Area Combined HQ (RN & RAF) at the following locations:

- C in C Plymouth at Mount Wise
- C in C Portsmouth at Fort Southwick
- Flag Officer Rosyth at Pitreavie Castle
- C in C Nore at HMS Pembroke (post war HMS Wildfire)

These HQ's, built to withstand a direct hit by a 500lb bomb, would house the Naval and Air Force commanders together with an army representative. Also accommodated, would be the Fortress Defence HQ (Coastal Artillery) and Air Defence HQ (Anti Aircraft Artillery)

Construction began in 1939 at Mount Wise on the previously chosen site in the dry ditch, but the plan was now for a two storey structure. As an interim measure, a temporary combined HQ was set up in Eggbuckland Keep, an early fortification in northeast Plymouth, together with the Fortress Defence HQ.

The naval command at this stage was C in C Plymouth and Western Approaches. A decision had already been made to re-locate Western Approaches HQ to a safer and more central location, initially to be on the Clyde the final choice was Liverpool where Derby House was taken over and strengthened, opening on 17th February 1940.

This transfer of function resulted in work at Mount Wise being halted at the half-way stage, however, in view of the large costs already made and in anticipation of the return to Plymouth of Western Approaches HQ post war, it was decided to complete the project as a protected HQ for C in C Plymouth and Fortress Defence HQ. It was fully complete by early 1941 and contained the following:

- C in C Plymouth
- Fortress Defence HQ
- AA Gun Operations Room (GOR)

The Fortress Defence, Fire Control moved, in 1943, to Wembury Battery where it remained until the end of the war. The GOR moved to Eggbuckland Keep at the same time, moving on to Crownhill Fort in 1948.

By 1943 planning for D Day was well underway. An outcome of this was the requirement for a series of protected tactical communications facilities at a number of strategic locations to serve all allied commitments. At Mount Wise this resulted in the construction of a series of underground tunnels beneath Admiralty House by 695th Artisan Works, 172nd & 178th Tunnelling Companies, RE and 99th & 828th Pioneer Companies, PC. Known as the Plymouth Underground Extension (PUE) it held radio, telephone, telegraph and voice frequency (vf)

terminals connected to, among others:

- Army Command and District HQ's
- Adjacent US Army/Navy HQ's
- Surrounding naval Sub HQ's
- Combined HQ's Portsmouth/Western Approaches
- RAF Command & Group HQ's
- RAF SW & NW Switching Centres
- Trafalgar & Rotunda SAC exchanges in London
- Government Communications Centres at Cheltenham/Bletchley Park
- US Transportation Centre, Plymouth
- SW Airfields, Radar & Radios Stations
- City & County Police/Fire/Civil Defence Controls



Sign on the door of the 2003 Commcen

Following the successful Invasion of Europe and the cessation of hostilities the main Bunker continued as HQ C in C Plymouth.

In 1951 it was decided to re-furbish the Western Approaches HQ in Liverpool, this was altered to the transfer of the HQ to Mount Wise as originally intended, however in 1952 Western Approaches Command was abolished. The PUE became disused from this date.

From 1951 to at least 1961, Mount Wise, by now called Maritime HQ was HQ of C in C Plymouth and contained the following elements:

Joint Operations Room.

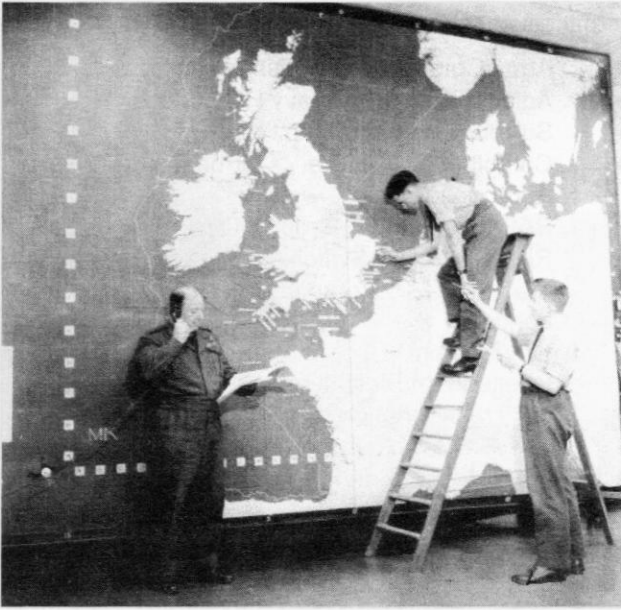
Upper Floor (glass fronted cabins)

- Flag Officer/Chief of Staff
- Air Officer Commanding/Senior Air Staff Officer

Lower floor

- Naval & Air plotting tables
- Naval State Boards
- Air State Boards
- Convoys
- Aircraft Availability

Maritime HQ Mount Wise



The map in the joint operations room in 1955, compare this with the cut down version of the map that is still in place



The main map in the Joint Operations Room - this has been cut down from its original size

- Independents
- Aircraft Task Board
- Enemy Submarines
- Own Naval Forces
- Task Force Organisation
- Duty Naval Commander With Switchboard with direct communications to Adjacent MHQ's each local sub area command and all RAF radar stations in area.
- RAF Controller Direct communications to AOC/SASO. Group Captain 15 Group. Joint Intelligence Section, MET Officer. Duty Signals Officer. And main floor of Joint Ops Room.

Elsewhere

- Naval Records Section To log and file incoming/outgoing operational information
- Air Records Section As above
- Shipping Section
 1. Shipping Room
 2. Shipping Movements and records room To liaise with civilian and military authorities to Provide up to date picture of Merchant Shipping
- Mine Counter Measures
- Operations Room
- Civil Defence Section Provides general picture of civil defence situation in area/sub area and to keep shipping informed of fallout conditions
- Meteorological Section Communications Section. Provided joint signals facilities

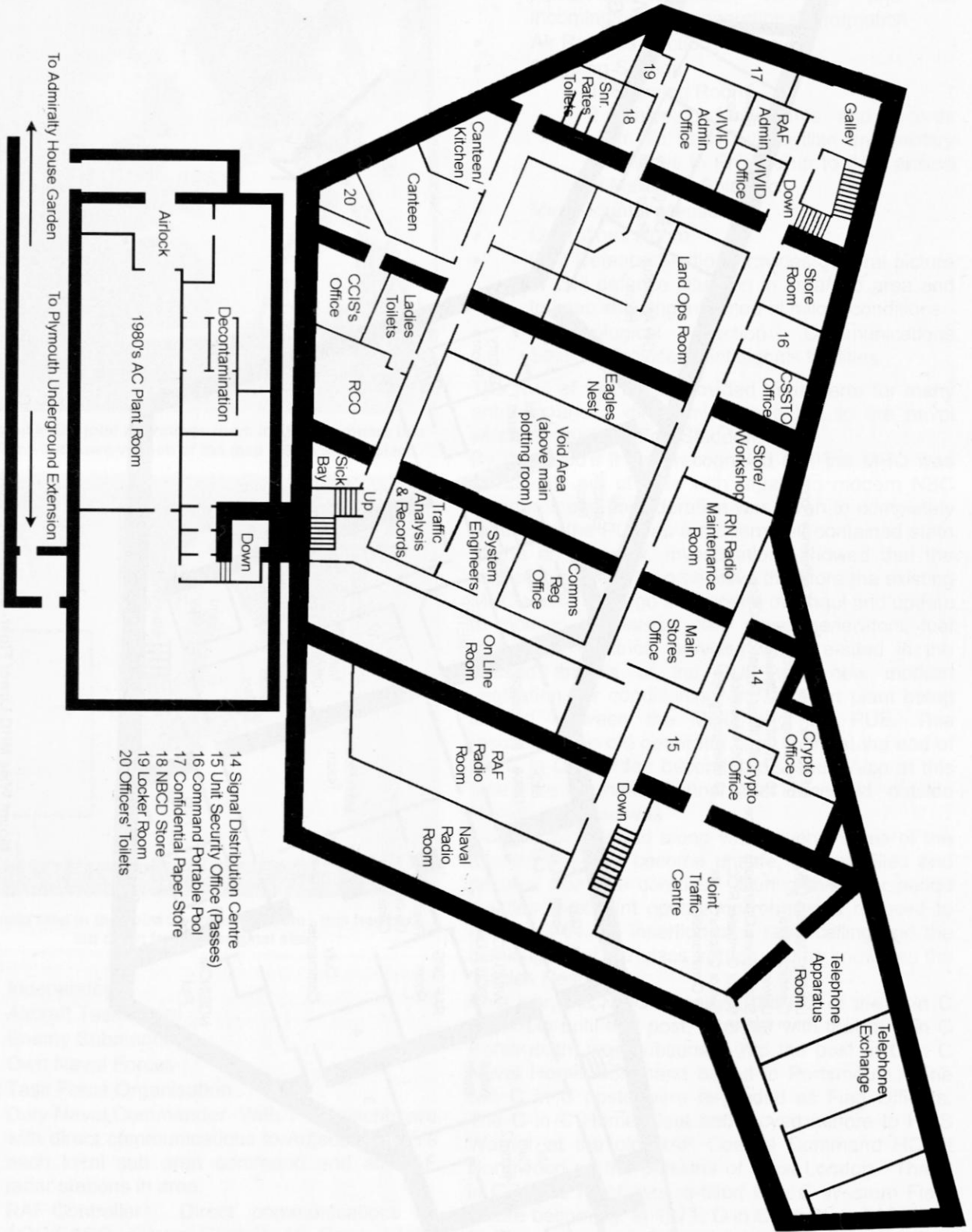
The roof of the MHQ provided aerial farm for many antenna and a direct microwave link to the naval wireless station at Fort Staddon.

By the 1980's it was recognised that the MHQ was completely out of date with regard to modern NBC standards and consideration was given to completely rebuilding the PUE as a modern self contained state of the art complex. Investigations showed that the cost of this would be prohibitive therefore the existing MHQ would undergo a complete overhaul and update to modern standards. New diesel generators, fuel tanks and electrical services were re-sited in the unused tunnels of the PUE with new modern ventilation, air conditioning and filtration plant being located between the MHQ and the PUE. This resulted in the old generator plant room at the end of the C in C's garden becoming disused. Also at this time, the entrance tunnel that emerged outside Hamoaze House was

blocked and sealed along with several areas of the tunnels that had become unsafe, backed filled and secured from the complex. During this later period the two level joint operations room was reduced to one level by the insertion of a false ceiling and the blanking off of the glass fronted cabins known as the 'Eagles Nest'

Post war, the MHQ remained the HQ of the C in C Plymouth until that post, together with that of C in C Portsmouth, was subsumed into the post of C in C Naval Home Command based in Portsmouth. The two C in C posts were re-graded as Flag Officers. The C in C Home Fleet had moved ashore to HMS Warrior at the old RAF Coastal Command HQ at Northwood on the outskirts of West London. The C in C Home Fleet was re-titled C in C Western Fleet before becoming, in 1971, C in C Fleet. In 2004 C in C Fleet relocated from Northwood, which by now become UK Permanent Joint Headquarters, to a brand new purpose built HQ on Whale Island (HMS Excellent) in Portsmouth Harbour thus drawing previously dispersed element together on one site.

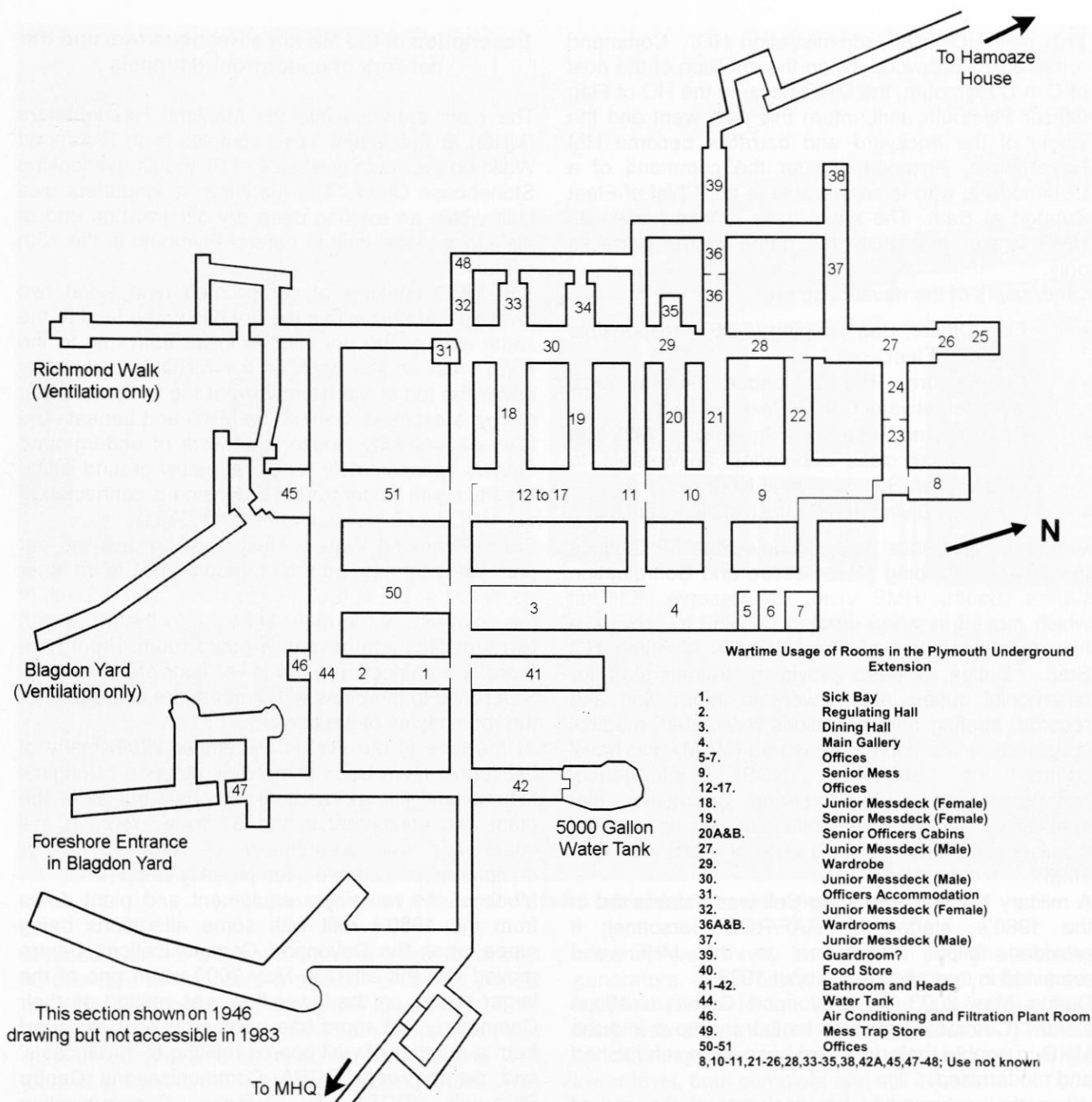
Maritime HQ Mount Wise



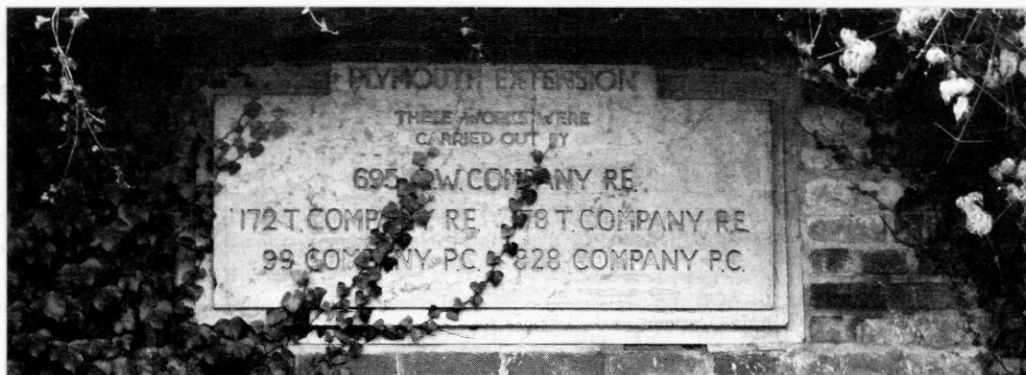
- 14 Signal Distribution Centre
- 15 Unit Security Office (Passes)
- 16 Command Portable Pool
- 17 Confidential Paper Store
- 18 NBCD Store
- 19 Locker Room
- 20 Officers' Toilets

Mount Wise MHQ Upper Floor - Drawn By Nick Cattford

Maritime HQ Mount Wise



Mount Wise Plymouth Underground Extension - Drawn By Nick Catford



Mount Wise Stone plaque above the emergency exit in Blagdon Boat Yard

Maritime HQ Mount Wise

This new HQ is an administration HQ. Command remains at Northwood. Upon the abolition of the post of C in C Plymouth, the MHQ became the HQ of Flag Officer Plymouth until, in turn this post went and the whole of the dockyard and barracks become HM Naval Base, Plymouth. Under the command of a Commodore, who is answerable to the Chief of Fleet Support at Bath. The naval base is also known as HMS Drake, previously the name of the barracks only.

Other users of the naval base are:

- Flag Officer, Sea Training (FOST) responsible to C in C Fleet
- Commodore, The Devonport Flotilla, local representative of C in C Fleet
- Captain, 2nd Submarine Squadron (SM2) with 7 Trafalgar class submarine answerable to Flag Officer, Submarines at Northwood
- Southern Diving and Explosive Disposal Unit.

Various lodger units have occupied the MHQ since the 1950's, including RAF Rescue and Coordination Centre (South), HMS Vivid, RN Reserve HQ Unit which moved in when created in 1959 to provide a fully functional part of Flag Officer's Maritime HQ Staff. Duties included providing: trained staff for ceremonial duties, admin work in information and records, briefing and operations room staff, medical specialists, mine countermeasures (MCM) and naval control of shipping (NCS), intelligence, communications and submarine operations plot specialists. HMS Vivid relocated to its present location, within the dockyard walls at Granby Gate in 1996.

A military Nuclear Reporting Cell was established in the 1960's, staffed by RAF/ROC personnel; it provided fallout information to the MHQ and remained in operation until about 1993.

During May 2003 the Devonport Communications Centre (Commcen) made a temporary move into the MHQ to enable their dockyard base to be refurbished and modernised.

When they returned to the dockyard at the end of 2004 the MHQ finally became empty and surplus to requirements and was handed over to Defence Estates for disposal and through whose good offices our visit was arranged.

Bob Jenner Feb 2005

Sources:

Keith Ward

PRO Files ADM 1/11119 ADM234/804

Resurgam, Archaeology at Stonehouse, Mount Batten and Mount Wise

The Historic Defences of Plymouth

HM Naval Base. Press Office

HMS Vivid

Defence Estates

Description of the Maritime Headquarters and the network of underground tunnels

The main entrance into the Maritime Headquarters (MHQ) at the Mount Wise complex is in Richmond Walk, on the south west side of Plymouth overlooking Stonehouse Creek. The Maritime headquarters was built within an existing deep dry ditch at one end of the 'Dock Lines' built to defend Plymouth in the 18th century.

The MHQ consists of complicated nine sided two level bunker built within the dry ditch. The land to the south east of the dry ditch is lower than that to the north west so the back of the MHQ is completely below the top of the ditch while at the front the upper storey is exposed. Behind the MHQ and beneath the lawn of Admiralty House a network of underground tunnels approximately sixty feet below ground called the Plymouth Underground Extension is connected to the MHQ by an inclined tunnel and steps.

From Richmond Walk a steep road passes the car park leads through an arch through gates to an inner courtyard at the end of the dry ditch. At the back of the courtyard is the main entrance to the MHQ with two turnstiles and beyond a guard room. From here there is an airlock into the lower floor of the bunker. Reference to the plans will illustrate the complexity of the room layout of the bunker.

At the time of our visit in December 2004, many of the rooms have been completely stripped of original fixtures and fittings ready for disposal but all of the plant and equipment in the BT frame room is still intact and will presumably be retained. Other equipment rooms have been partially stripped.

Much of the remaining equipment and plant dates from the 1980's refit with some alterations being made when the Devonport Communications Centre moved into the MHQ in May 2003 when one of the larger rooms on the lower floor was refitted as their Commcen. This room has been stripped bear apart from a number of wall boards relating to 'broadcasts' and on the door DCSA Communications Centre Plymouth (DCSA is Defence Communication Services Agency). One equipment rack is also still in place.

The heart of the bunker was the joint operations room which, as built, spanned both floors with three glass fronted cabins projecting into the upper level on a gallery overlooking the two large plotting tables. During the 1980's refit a false ceiling was inserted reducing the height of the room to one level. On the upper floor the glass fronted cabins known as the 'Eagles Nest' have had the glass walls paneled to form a series of cupboards within the three rooms. It is not possible to enter the void above the false ceiling.

On the lower floor below the blanked off cabin, a single glazed cabin remains in place with sound proofed telephone facilities, it is unclear if this is

From Bob Jenner

Maritime HQ Mount Wise



The Joint Operations Room after the 1980's refit when a false ceiling was fitted

retained from the original room or is a new structure. At one side of the room a number of ceiling panels have been removed and it possible to see one of the original wall maps still spanning both floors. The main map of Europe also spanned both floors and was located in front of the cabins and plotting tables. This original map appears to be still in place having been cut down to a smaller size to fit the reduced height of the room.

The BT frame room is virtually intact and still 'live'. Equipment includes an old-style Main Distribution Frame (MDF), new style Krone-type distribution boxes, a relay patch bay for interconnecting circuits with patch cords and several bays of repeaters in Type 62 practice racks. There is also cable pressurisation equipment comprising a compressor with pressure monitoring dials above. A workshop bench has some kind of 19" equipment case under repair. In an adjacent room is the UPS (uninterrupted power supply) for the bunker consisting of racks of lead acid batteries that would have maintained a continuous power supply to the bunker in the event of a sudden power loss. These

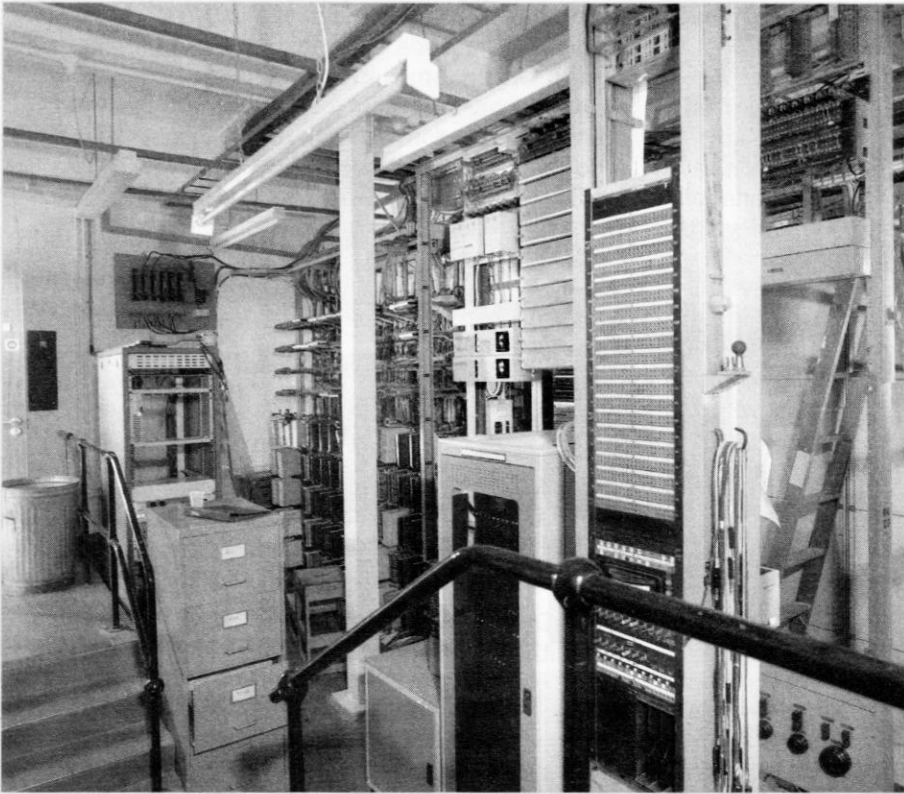
batteries would only be required until the standby generators were brought on line but could have supplied power to the bunker for a short period if there was also a failure in the generators. Two air conditioning plant rooms are also located on the lower level, both complete and still in use.

On the upper level most of the rooms had been offices and are now stripped bare. One of the larger rooms was the radio room which still contains a large number of equipment racks. It would appear no attempt was being made to remove the racks although they have been stripped of any valuable or sensitive components.

From the upper floor a stairway leads up to a third sub level projecting above the level of the dry ditch. This was added during the 1980's rebuild and houses further air conditioning and filtration plant. From here there is a second airlock giving access to the roof of the bunker, the grounds of Admiralty House and the network of underground tunnels (PUE)

On the roof the bases and fittings for numerous aerials and two emergency exits from the MHQ can be seen and at the southern tip there is a short

Maritime HQ Mount Wise



The GPO Frame Room showing from left to right empty 19" rack cabinet, old-style Main Distribution Frame (MDF), new style Krone-type distribution boxes, sundry relay strips (horizontal, grey covers), patch bay for interconnecting circuits with patch cords, alarm lamps and spare patch cords.

microwave tower with line of sight to the wireless station at Fort Staddon. From the roof the original WW2 generating station (now relocated to the PUE) can be seen in the Admiralty House Gardens immediately south of the west entrance to the MHQ. This consists of a large windowless concrete blockhouse. There are two smaller concrete structures projecting from the MHQ with gridded openings forming part of the ventilation system.

The main entrance to the PUE was at the south west corner of Hamoaze House, now a non residential support centre. This tunnel has been blocked at both ends and is partially back filled.

Of the four remaining ways in to tunnel complex only two are now accessible, one being the previously mentioned access through the MHQ. The three remaining access points are on the foreshore, two in Blagdon Boat Yard (which was built on spoil excavated from the tunnels) and one in Richmond Walk. One of the adits in Blagdon Yard is retained for emergency egress and has a securely locked and alarmed with a gridded gate. A stone tablet above the portal is inscribed to the Tunnelling and Pioneer Companies that excavated the tunnels. The other two foreshore adits have been permanently blocked but are still used for ventilation.

The tunnels were excavated as a protected communications centre prior to D Day and also provided protected accommodation and mess

facilities. In the 1980's refit of the MHQ a section of the tunnels were refurbished to house the new standby generators and associated electrical switchgear for the MHQ above.

At the bottom of the main stairs down from the MHQ there was originally a dog leg in the passage to provide added blast protection, this has now been bypassed and the entrance tunnel now leads straight into the main east - west spine 'corridor'.

All the tunnels to the right (north) of this spine 'corridor' have been disused for many years, some have been bricked up while others are blocked with wooden planks. At least two of the passages are still open giving access to the entire disused section. These tunnels, which are now unlit, are laid out in a grid pattern with three main north - south tunnels linked by numerous cross passages. The tunnels

vary in height and width with the middle north - south passage being at least fifteen feet high with several brick partition walls dividing the tunnel into several large rooms. All the tunnels on this side of the complex have been stripped bare apart from one short side tunnel which still has an old (1940's) four bay patch board standing upright in the centre of the floor.

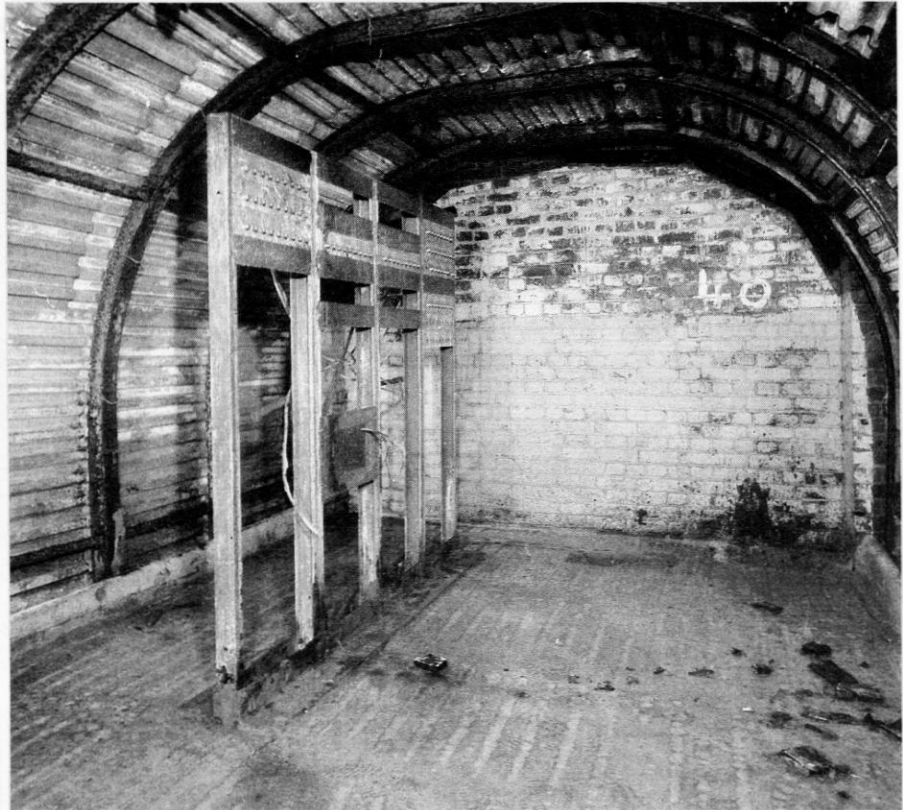
Back in the spine 'corridor', at the first crossroads the way on to the right has now been blocked, this was a short passage to the 5000 gallon water tank. To the left a tunnel leads through a dog leg to the emergency exit in Blagdon Yard. A short distance along this passage there are two small doors on the right hand side labeled 'Diesel Fuel Oil Tank Hall No. 1' (and No. 2). Each door leads to one of the 3700 litre diesel tanks which have been installed in a tunnel parallel to the spine 'corridor'. This tunnel has been divided into two unconnected sections. The fuel tanks are at the eastern end with the two diesel generators at the western end.

Three short cross passages on the left (south) side of the spine corridor have been reused in the 1980's when the MHQ was upgraded. The first room is a transfer pump room for diesel fuel the name on the door reads 'Diesel Fuel Oil Transfer Hall'. From here fuel can be pumped out of the fuel tanks in the adjacent tunnel into the header tanks in the generator hall. The second passage contains two compressors

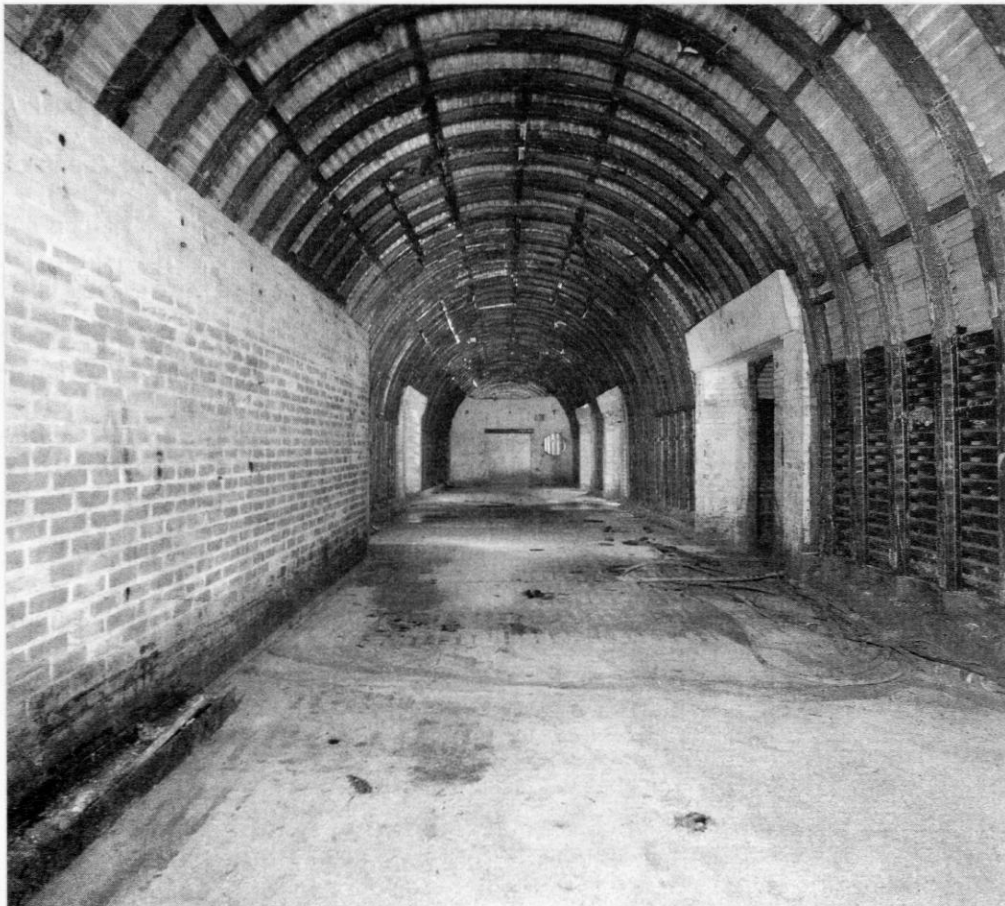
Maritime HQ Mount Wise

feeding three reservoirs and the third room contains a large rack of modern electrical switchgear, all current. A door at the back of this room leads into the generator hall in the parallel tunnel described earlier. Each of the two diesel generators is housed within a small room within the generator hall.

At the end of the main spine 'corridor' there is a 'T' Junction. Right leads to the disused section of the tunnel network and the blocked tunnel to Harnoaze House. To the left the passage leads to another door into the generator hall and beyond that the tunnel splits each arm leading through a dog leg for blast protection to the two blocked adits on the foreshore. Each adit is fitted with a metal louvered grille for ventilation.



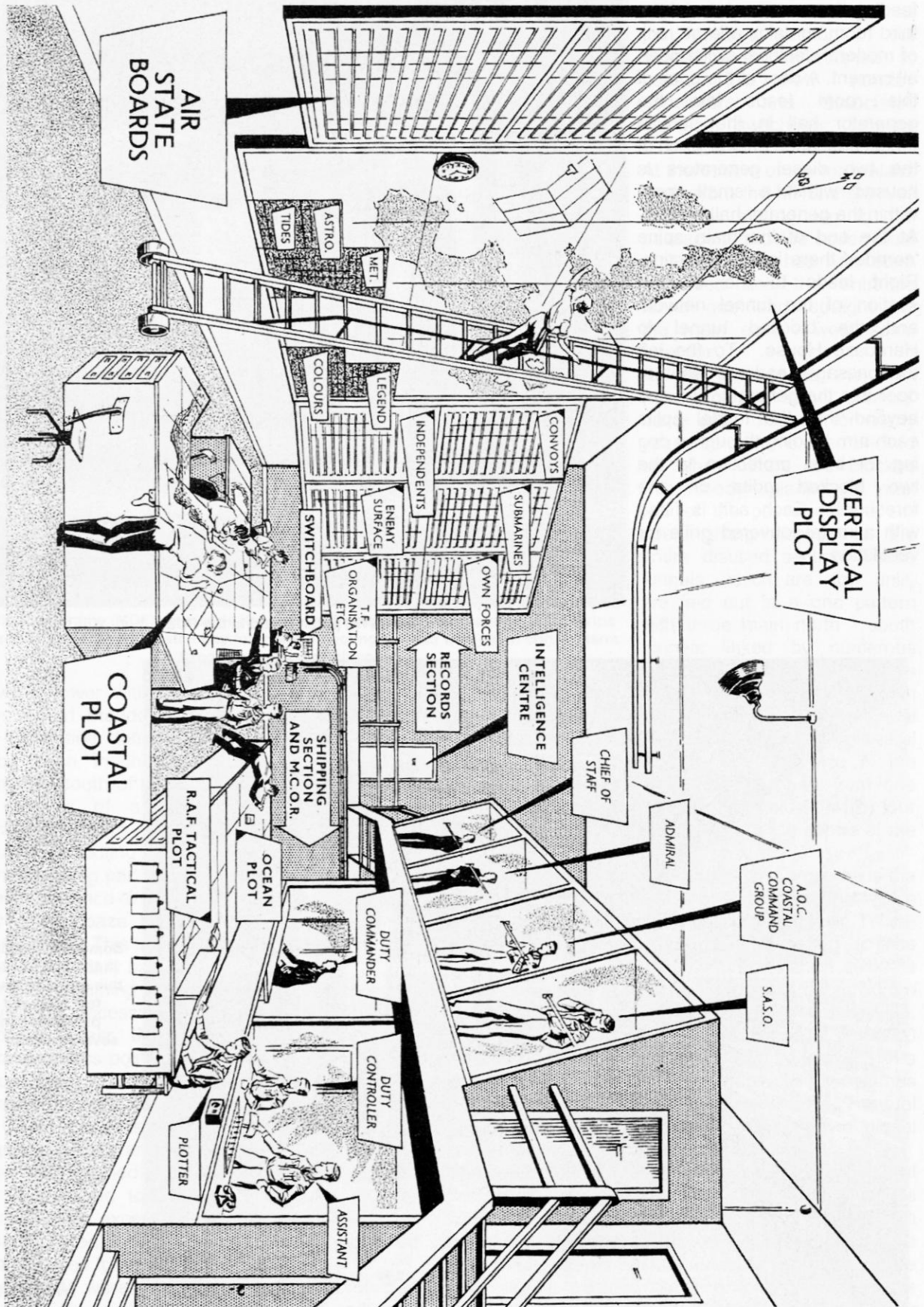
The WW2 patch board in the PUE



Some of the galleries in the PUE are high, this one is at least 18 feet high and is partitioned into several 'rooms' with brick walls.

*From
Nick Catford*

Maritime HQ Mount Wise



Mount Wise - Post war layout of the Joint Operations Room

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